Canberra Industries, Inc. 45 Gracey Avenue Meriden, Connecticut 06450 Tel. 203-238-2351 TWX: 710-461-0192

CANBERRA

Dear Customer:

Thank you for your inquiry and for your interest in our products. Enclosed please find the literature you requested. If you have any questions or require additional information, please do not hesitate to contact your area Canberra Sales Representative as listed below:

PULCIR, INC.
P. O. Box 357
Oak Ridge, TN 37830

Tel: (615) 483-6358

Once again, thank you for your interest in CANBERRA and we hope to be of service to you in the near future.

Sincerely,

CANBERRA INDUSTRIES, INC.

Donna Jones

Donna Jones
Domestic Sales Administrator

DJ/ees
cc: Pulcir, Inc.
Enclosure(s)

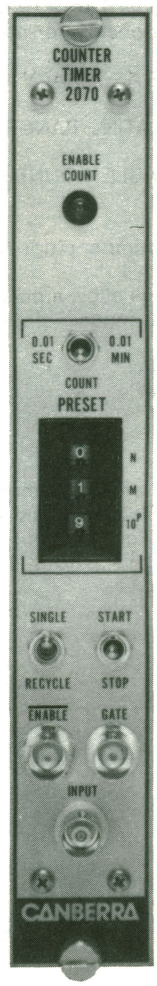
Represented by:
PULCIR, INC.
P. O. BOX 357
OAK RIDGE, TN 37830
PHONE 615/483-6358

CANBERRA

# Model 2070 Counter Timer

## Features

- Preset Timer or Counter Operation
- Enable Output allows Start, Stop, and Reset of other counters
- Positive or negative logic input
- 3 digit preset
- 8 decade count capacity
- Crystal Time Base
- Single Width NIM




## Description

The Canberra Model 2070 Counter Timer provides, in a single-width NIM module, a time base and presetting logic with a range of eight decades. Normal operation is either as a preset timer or as a preset counter in a system controller function. When in the preset count mode, the input accepts positive TTL voltage, or negative NIM current pulses without polarity switching or jumper changes.

The internal crystal time-base provides time increments of 0.01 seconds or 0.01 minutes, and live time gating at one microsecond resolution.

Preset control is accomplished with a three-digit thumbwheel switch providing a preset range from one to $99 \times 10^6$ increments. The preset setting takes the form of $NM \times 10^P$.

A front panel LED indicates that the unit is enabled to count (ENABLE COUNT indicator).

The SINGLE-RECYCLE mode switch provides a means of automatically placing the unit or system back into the counting mode ten seconds after reaching preset, or when the count mode is terminated.

Remote starting is provided by applying a positive pulse to the rear panel START IN connector.

A positive output pulse is available from the rear panel STOP OUT connector at the time the counting mode is terminated. This pulse can be used to initiate system printout with all standard Canberra scanners.

A convenient ENABLE output will allow the Model 2070 to START, STOP, and RESET single or multiple combinations of other Canberra Series 2000 counting modules.

Internal jumpers can change the impedance of the count input for positive voltage pulses from 1k ohms to 50 ohms. This permits termination of cables from equipment that do not source match the coax, and prevents reflections from causing multiple counting.

External connection to the GATE input will permit gating of incoming pulses when in the preset count mode, and gating of the time base when in the preset time mode. In this mode the gate provides one microsecond resolution. Thus when a system busy signal is connected to this input, the 2070 will provide extremely accurate dead time corrections.

## Specifications

**INPUTS**

INPUT - Positive NIM logic (> +2.0 volts and < +6 volts peak, width > 200 nsec), or negative NIM logic (> - 0.6 volts and < - 1.6 volts peak, width > 200 nsec); input rise and fall time 1 nsec to 300 nsec; Zin = 1k ohm dc for positive signals (selectable by internal jumper to 50 ohms); Zin = 50 ohms dc for negative signals.

GATE - +4 to +5 volts or open circuit allows counting; zero to +0.8 volts inhibits counting; Zin = 100k ohm to 5 volt bus. When gating time, connection to a system busy signal provides for system dead-time correction with 1$\mu$sec resolution.

START IN - Positive pulse input from rear panel BNC places unit into the counting mode (> 4 volts and < 5 volts peak, width > 200 nsec, rise and fall time 1 nsec to 500 nsec, $Z_{in}$ = 100k ohm, dc).

ENABLE - (bidirectional) as input; zero to +0.8 volt level enables counting mode; +4 to +5 volts or open circuit disables counting mode; $Z_{in}$ = 4.7k ohm to +5 volt bus.

**OUTPUTS**

ENABLE - (bidirectional) as output; zero to +0.8 volt level indicates counting mode enabled and provides control of count mode to other modules; +4 to +5 volt level indicates counting mode disabled; sinks 20 mA, sources from 4.7k ohm to +5 volt bus.

STOP OUT - positive output pulse to rear panel BNC occurs when preset is reached (> +2.5 volts at 1 mA source current, +5 volts at zero source current, sinks 2 mA at +0.5 volts, width > 5 and < 10 microseconds).

**FRONT PANEL CONTROLS**

START/STOP - two-position momentary toggle switch initiates or terminates a counting sequence.

SINGLE/RECYCLE - two-position toggle switch selects single or recycle mode of operation upon reaching a preset condition.

# Specifications (continued)

0.01 SEC/COUNT/0.01 MIN - time base or count preset selector; three-position toggle switch to select 0.01 seconds, 0.01 minutes, or the external COUNT input as the preset function.
PRESET NM x $10^P$ - three digit thumbwheel switch for preset control. M is units, N is tens, P has the power of 10, N and M range from 0 to 9; P has a range of 0 through 6; N=M=0 disables the preset function.

**PERFORMANCE**

PRESET RANGE - equals 1 to 99 x $10^6$ increments.
COUNT RATE -1 MHz positive or negative, minimum width 300 nsec.
CRYSTAL TIME BASE ACCURACY - ± 0.0025% over operating temperature range.
TEMPERATURE OPERATING RANGE - 0 to 50°C.

**INDICATOR**

Front panel LED ENABLE COUNT indicates the unit is in the counting mode.

**INTERNAL CONTROLS**

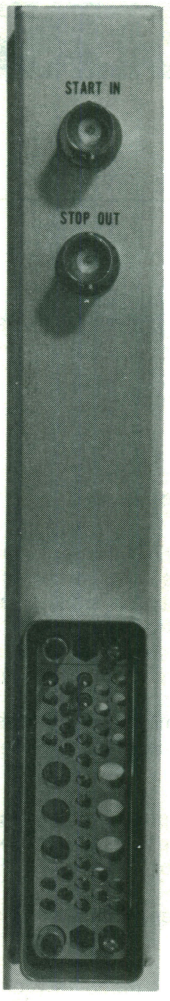
INPUT IMPEDANCE - Jumper plugs select 1k ohm or 50 ohms for positive input.
$\overline{\text{ENABLE}}$ - Jumper plugs allow a pulse on $\overline{\text{ENABLE}}$ input to place the 2070 in the count mode.

**POWER**

| | |
|---|---|
| +12 V | 80 mA |
| - 12 V | 5 mA |
| +24 V | 0 |
| - 24 V | 0 |

**PHYSICAL**

SIZE - standard single width NIM module; 3.43 x 22.13 cm (1.35 x 8.71 inches) per TID-20893 (rev. A)
NET WEIGHT — 0.82 kgs (1.8 lbs.)
SHIPPING WEIGHT - 3.1 kgs (6.8 lbs.)




S151ROM10 11/81 Printed in U.S.A.

CANBERRA

# NaI Detectors and Nim Accessories Price List

## SCINTILLATION DETECTORS/PHOTOMULTIPLIER TUBE ASSEMBLIES

| | | |
|---|---|---|
| 802-1† | NaI Crystal 1-1/2" dia x 1"<br>(3.81 cm dia x 2.54 cm) | $ 295. |
| 802-3† | NaI Crystal 2" dia x 2"<br>(5.08 cm dia x 5.08 cm) | 395. |
| 802-3W† | NaI Crystal 2" dia x 2", Well = 0.625" dia x 1.438"<br>(5.08 cm dia x 5.08 cm, Well = 1.59 cm x 3.65 cm) | 450. |
| 802-4† | NaI Crystal 3" dia x 3"<br>(7.62 cm x 7.62 cm) | 1,060. |
| 802-4W† | NaI Crystal 3" dia x 3", Well = 0.656" x 2.063"<br>(7.62 cm x 7.62 cm, Well = 1.66 cm x 5.24 cm) | 1,180. |
| 1701† | NaI Crystal for X-ray detection<br>1" dia x 0.039" (2.54 cm x 1 mm) | 695. |
| 1702† | NaI Crystal with built-in Preamp for X-ray Detection<br>1" dia x 0.039" (2.54 cm x 1 mm) | 1,100. |

## NAI SHIELDS AND ACCESSORIES†

| | | |
|---|---|---|
| 7410 | Universal Lead Shield with Side Door | 860. |
| 7411 | Universal Lead Shield for Well Detector (Without Side Door) | 675. |
| 7412 | Lucite Sample Shelf (for 7410 Shield) | 95. |
| 7413 | Clamp Ring for 7410 or 7411 Shield, Specify dia.,<br>2-5/16" for 802-1, 802-3, 802-4, 802-3W,<br>802-4W; 1-3/4" for 1701, 1702 | 90. |
| 7413A | Adapter Ring. Specify 2-5/16" for 802-3W or 3-1/4"<br>for 802-4W. (Required for Well detector in 7411 shield.) | 80. |

## CABINETS †

| | | |
|---|---|---|
| 5015 | NIM Bin Cabinet (Blue) (Optima E-081920HT) | 200. |
| 5000 | Floor Cabinet: 67"H x 19"W x 29"D - I.D. | 975. |
| 5001 | Floor Cabinet: 57"H x 19"W x 29"D - I.D. | 945. |
| 5003 | Floor Cabinet: 49"H x 19"W x 29"D - I.D. | 735. |
| 5004 | Bench Cabinet: 28"H x 19"W x 29"D - I.D. | 450. |
| 5005 | System Power Panel | 420. |

## TELETYPES and PAPER PUNCHES

| | | | |
|---|---|---|---|
| 5101-1 | 3320/3JC ASR-33 Teletype with Motor Control<br>and Cable (60Hz, 110V) | Requires 1488 | 1,775. |
| 5101-2 | 3320/3WE ASR-33 Teletype with Motor Control<br>and Cable (50Hz, 110V) | Requires 1488 | 1,785. |
| 5101-3 | 3320/3WE ASR-33 Teletype with Motor Control.<br>Cable and Step Down Transformer (50Hz, 220V) | Requires 1488 | 1,820. |
| 5301 | Teletype BRPE 100 cps Punch and Power Supply | Requires 1487,<br>1487D | 2,250. |
| 5302 | FACIT 4070.0004 75 cps Punch and Power Supply | Requires<br>Modified 1487 | 2,745. |

† Non Canberra Manufactured Item

Effective June 4, 1979

## ACCESSORIES

| | | | |
|---|---|---|---|
| **Printer/Punch †** | | | |
| A1488-1 | TTY Printer Paper (Box of 12 Rolls) | | $ 25. |
| A1488-2 | TTY Punch Paper Tape (Box of 28 Rolls) | | 50. |
| A1488-3 | TTY Ribbon (Box of 6 Rolls) | | 25. |
| A1489-16 | Printer Paper Tape (Box of 10 Rolls) | | 50. |
| A1489-17 | Printer Ribbon (Box of 6 Rolls) | | 25. |
| A2089-2 | Standard Printer Ink Paper (Box of 25 Rolls) | | 50. |
| A2089-3 | Pressure Sensitive Printer Paper (Box of 25 Rolls) | | 100. |
| A2089-4 | Ink Cartridge (Box of 6) | | 25. |
| **Connectors and Adaptors †** | | | |
| CA130 | BNC Tee Connector (One Male, Two Female) | | 7. |
| CA131 | BNC Terminator, 50 ohm | | 7. |
| CA132 | BNC Terminator, 100 ohm | | 6. |
| CA134 | MHV Female Bulkhead Jack, Threaded 3/8-32 | | 10. |
| CA135 | SHV Female Bulkhead Jack, Threaded 3/8-32 | | 11. |
| CA136 | SHV Tee Connector (One Male, Two Female) | | 45. |
| CA137 | MHV Tee Connector (One Male, Two Female) | | 11. |
| CA138 | BNC Male Plug | | 4. |
| CA139 | MHV Male Plug | | 6. |
| CA140 | SHV Male Plug | | 10. |
| CA141 | BNC Barrel (Two Female) | | 3. |
| **Coaxial Cables** | | | |
| C120-X | BNC to BNC; RG62/U, 93 ohm Cable<br>Specify X = .5, 1, 2, 3, 4, 4.5, 5, 10, 15, or 30 Feet<br>Non Standard Lengths = | | $10.<br><br>30¢/ft. + $15. |
| C122-X | MHV to MHV; RG59/U, 75 ohm Cable<br>Non Standard Lengths = | Specify X = 15 Feet | $15.<br>30¢/ft. + $20. |
| C123-X | SHV to SHV; RG59/U, 75 ohm Cable<br>Non Standard Lengths = | Specify X = 10, 15, or 30 Feet | $30.<br>30¢/ft. + $35. |
| C124-X | SHV to MHV; RG59/U, 75 ohm Cable<br>Non Standard Lengths = | Specify X = 15 Feet | $30.<br>30¢/ft. + $35. |
| C125-X | BNC to BNC; RG59/U, 50 ohm Cable<br>Non Standard Lengths = | Specify X = .5, 1, or 2 Feet | $10.<br>30¢/ft. + $15. |
| C126-X | BNC to SHV; RG59/U, 75 ohm Cable<br>Non Standard Lengths = | Specify X = 1 Foot | $12.<br>30¢/ft. + $17. |
| C127-X | BNC to MHV; RG59/U, 75 ohm Cable<br>Non Standard Lengths = | Specify X = 1 Foot | $12.<br>30¢/ft. + $17. |
| **Specific Nuclear Instrument Cables** | | | |
| C1400A-1 | Slave Bin Power Cable | | 25. |
| C1402-X | Preamp Power Cable | Specify 5, 10, or 15 Feet | 25. |
| C1403 | Module Power Extender | 3 Feet | 25. |
| C1404-1 | NIM Daisy Chain Data Cable | 6 Inches | 25. |
| C1404-2 | NIM Daisy Chain Data Cable | 2 Feet | 25. |
| C1405 | DECWriter Adapter Cable; 9 pin Amphenol to MAT-N-LOCK | | 50. |
| C1406 | TTY model 43 Cable | | 50. |
| C1488 | TTY Cable, 9 pin Amphenol to Pigtails.<br>Included in S1488 and TTYs | 8 Feet | 50. |
| C8029 | 2007P Preamplifier Power Cable | 10 Feet | 15. |
| **Service Kit** | | | |
| S1488 | TTY Motor Control Modification Kit and Cable | | 180. |
| **Blank Nim Modules** | | | |
| 1401-1,2,3 | Single, Double or Triple Width Module | | 50. |
| 1402-1,2,3 | Single, Double or Triple Width Front Panel Only | | 20. |

F.O.B. Meriden, Connecticut/Minimum order $50.00/Prices subject to change without notice.

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE, MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra/Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottoorunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS18R2 5/79 Printed in U.S.A. 

CANBERRA

# Series 80 Price List

## SERIES 80 PROCESSORS

| | | |
|---|---|---|
| | Free-standing units; specify suffix RM for rack mount. | |
| 8602 | 2048 Channel Series 80 Processor, features:<br>• 12" (30cm) CRT<br>• Front End Module Mounting Slot<br>• Terminal Interface (Current Loop and EIA)<br>• Dual Cursors<br>• Log and Autoranging Linear and Square Root Display<br>• Digital Integration<br>• 4 I/O Interface Slots | $ 9,400. |
| 8603 | 4096 Channel Series 80 Processor, as above | 9,900. |
| 8604 | 8192 Channel Series 80 Processor, as above | 10,900. |
| 8605 | 16,384 Channel Series 80 Processor, as above, with 2 I/O interface slots | 12,900. |

## MEMORY

| | | |
|---|---|---|
| 8612 | 4096 Channel Data Memory, including 4K byte scratchpad memory. Replaces existing memory. Credit issued upon return to factory. | 1,550. |
| 8613 | 8192 Channel Data Memory, as in 8612 above. | 1,950. |
| 8614 | 16,384 Channel Data Memory, as in 8612 above. | 3,650. |

## ADCs AND SIGNAL PROCESSING UNITS

| | | |
|---|---|---|
| | ADC board and interface mount internal to 8600 Processor or 8683A Expansion Chassis. ADC controls and signal processing are on front panel unit (Signal Processing Unit). | |
| **Front End Modules (ADC, Collect Interface and Signal Processing Unit)** | | |
| 8621 | ADC/SCA. Includes 100MHz, 8192 Channel ADC, DMA Interface, and Independent SCA. | 1,500. |
| 8622 | PHA/MCS. Includes all features of 8621 plus 20MHz MCS inputs and Amplifier with BLR. | 2,500. |
| 8623 | PHA/LTC. Includes all features of 8621 plus Spectroscopy Amplifier, Baseline Restorer, Pulse Pileup Rejector, and Live Time Corrector. | 2,500. |
| 8624 | ADC/Gated Mixer Router. Includes all features of 8621 plus a 4-input mixer/router with independent live or true time and linear gate for each input. Capability of 1, 2 or 4 spectra (any spectrum size up to 8192 channels per spectrum if enough memory in processor). | 2,750. |
| **Signal Processing Units (No ADC or Collect Interface. Can be exchanged with any other Signal Processing Unit by removing top cover and unplugging)** | | |
| 8622A | Signal Processing Portion Only of 8622. | 1,250. |
| 8623A | Signal Processing Portion Only of 8623. | 1,250. |
| 8624A | Signal Processing Portion Only of 8624. | 1,500. |
| **External ADC Interface** | | |
| 8633 | External ADC Interface. Allows an external Canberra ADC (8040, 8060, 8070, 8070A, or 8080) to be used with the 8600 Processor or 8683A Expansion Chassis. | 750. |

Effective June 4, 1979

## ANALYSIS OPTIONS

| | | |
|---|---|---|
| | Mount in master ROM card in 8600 Processor. Consult factory for field installation procedure. | |
| 8641 | Peak Analysis Option. Includes 2nd-Order Energy Calibrate, Peak Search, Peak Net Area, and % Error. | 750. |
| 8642 | Data Manipulation Option. Includes Smooth, Fractional Strip, Ratio and Normalization. | 400. |
| 8643 | Isotope Identification Option. Includes Library Input/Output, Library Scanning, Isotope Identification, Standard ROM Library, and RAM Library for User Generated Isotope Libraries. Requires 8641. | 750. |
| 8644 | Quantitative Isotopic Analysis Option. Includes Efficiency Calibration, Quantitative Isotopic Analyses, and Efficiency Table I/O. Requires 8641 and 8643. | 950. |
| 8645 | Learn/Execute Option. Includes Sample Changer Control, 7 each 32 Step Program RAMs, Program Editing, Program I/O, and Program Chaining. | 750. |

## I/O INTERFACES

| | | |
|---|---|---|
| **Plotter** | | |
| 8651 | X–Y Plotter Interface (Single I/O slot) | 450. |
| 8651-B | HP7004B Plotter Cable | 125. |
| 8651-C | General Purpose X-Y Plotter Cable | 75. |
| **EIA** | | |
| 8652-X | Single EIA Interface (Single I/O slot) | 450. |
| 8653-XX | Dual EIA Interface (Single I/O slot) | 750. |
| | Model number suffix X or XX must be specified at time of order. | |

| X | INTERFACE |
|---|---|
| A | Model 5204 HP7221A Graphics Plotter |
| B | Model 5308 FACIT 4070 Punch with EIA Interface |
| C | Model 5309 FACIT 4021 Reader with EIA Interface |
| D | Model 5405 Techtran Cassette |
| E | Model 5411 Digital Cassette |
| F | Model 5505 Centronix Printer |

| | | |
|---|---|---|
| **Mass Storage** | | |
| 8661 | Industry Compatible Magnetic Tape Interface, Controller and Cable (Single I/O Slot) | 2,950. |
| 8662-R | Dual Floppy Disk with Interface, Controller, and Cables. (Single I/O Slot) (10.5"H). Rack Mount Version. Specify 8662-F for free-standing unit. | 4,950. |
| **Computer** | | |
| 8671 | JUPITER Computer Networking Interface (9.6K baud). (Single I/O Slot) | 1,950. |
| 8673 | JUPITER Computer Networking Interface (300 to 57.6K baud). (Single I/O Slot) (Requires 8645 Learn/Execute, and 8673C or 8673V Interface Card in the Computer) | 2,750. |
| 8673V | Q-BUS Interface for JUPITER | 1,050. |
| 8673C | UNIBUS Interface for JUPITER | 1,050. |

## MISCELLANEOUS

| | | |
|---|---|---|
| 8681 | Memory Protection Power Supply. Protection time varies with memory size. | 750. |
| 8683A | Series 80 Expansion Chassis and Power Supply. Provides 3 Front End Module Positions, 14" High Rack Mount Unit, Cable Driver and Cable. (See Diagram #2.) | 3,450. |
| 8685A | Service Kit. Includes Schematics, Card Extenders, and Instructions. | 425. |
| 8686 | Rack Mount Adapter Kit (Required to convert existing Table Mount to Rack Mount) | 125. |
| HC-3 | Hand Held CRT Camera with Polaroid Pack and Series 80 Hood | 675. |

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE, MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra/Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottobrunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS12R3 5/79 Printed in U.S.A. 

CANBERRA

# Series 80 Peripherals, Accessories and Configuration Guide

## PERIPHERALS AND ACCESSORIES

| | | |
|---|---|---|
| **Teletypes and Terminals† (Interface included in Series 80 Processor)** | | |
| 5101-1 | 3320/3JC ASR33 Teletype with Motor Control and Cable (60Hz, 110V) | $ 1,775. |
| 5101-2 | 3320/3WE ASR33 Teletype with Motor Control and Cable (50Hz, 110V) | 1,785. |
| 5101-3 | 3320/3WE ASR33 Teletype with Motor Control, Cable, and Stepdown Transformer (50Hz, 220V) | 1,820. |
| 5102 | LA36 DECWriter II and Cable | 2,200. |
| 5103 | TI Silent 733 KSR Terminal, including 1 Roll Paper and Cable | 2,285. |
| 5103-1 | TI Silent 733 ASR Terminal with Single Cassette Drive, including 1 Roll Paper, 2 Cassettes, and Cable | 3,500. |
| 5103-2 | TI Silent 733 ASR Terminal with Dual Cassette Drives, including 1 Roll Paper, 2 Cassettes, and Cable | 3,800. |
| 5107-1 | Teletype model 4320-AAK, with Motor Control, Cable, and 1 Box of Paper (50/60Hz, 110V) | 1,400. |
| 5107-2 | Teletype model 4320-AAK, with Motor Control, Cable, 1 Box of Paper, and Stepdown Transformer. (50/60Hz, 220V) | 1,450. |
| 5108 | TI Model 743 Silent KSR, including 1 Roll Paper and Cable | 1,885. |
| **X–Y Plotters†** | | |
| 5201 | Houston 2200-26 Point Plotter and Cable (Requires 8651) | 2,950. |
| 5202 | HP7004B Point Plotter (Requires 8651-B and 8651) | 4,355. |
| 5204 | HP7221A Color Graphics Plotter and Cable (Requires 8652-A) | 5,600. |
| **Paper Tape I/O†** | | |
| 5308 | FACIT 4070.0004, 75cps Punch and Power Supply (Requires 8652-B or 8653-BX) | 3,240. |
| 5309 | FACIT 4030, 120cps Reader w/Two Fan Fold Bins and RS232 Interface (Requires 8652-C or 8653-CX) Add $345 for Active Servo Spooler | 1,110. |
| **Cassette Tape I/O** | | |
| 5406† | Techtran 817 Cassette Unit (Requires 8652-D or 8653-DX) | 1,685. |
| 5411 | Digital Cassette Recorder with Cable, Test Cassette, 1 Blank Cassette (Requires 8652-E or 8653-EX) | 550. |
| **Printer†** | | |
| 5505 | Centronics 306 80 column, 100cps with Motor Control and Vertical Format Control (for 50Hz specify-50 and Add $100) (Requires 8652-F or 8653-FX) | 3,220. |
| **Cables and Accessories** | | |
| C1405 | DECWriter Adapter Cable; 9 pin Amphenol to MAT-N-LOCK | 50. |
| C1406 | TTY model 43 Cable | 50. |
| C1488 | TTY Cable, 9 pin Amphenol to pigtails. Included in S1488 and with TTYs. | 50. |
| S1488 | TTY Motor Control Modification Kit and C1488 Cable. Included in TTYs. | 180. |
| **Cabinets (Inside Dimensions)** | | |
| 5000 | Floor Cabinet: 67"H x 19"W x 29"D | 975. |
| 5001 | Floor Cabinet: 57"H x 19"W x 29"D | 945. |
| 5003 | Floor Cabinet: 49"H x 19"W x 29"D | 735. |
| 5004 | Bench Cabinet: 28"H x 19"W x 29"D | 450. |
| 5005 | System Power Panel | 420. |

† Non-Canberra manufactured items.

F.O.B. Meriden; Connecticut/Minimum order $50.00/Prices subject to change without notice.

Effective June 4, 1979

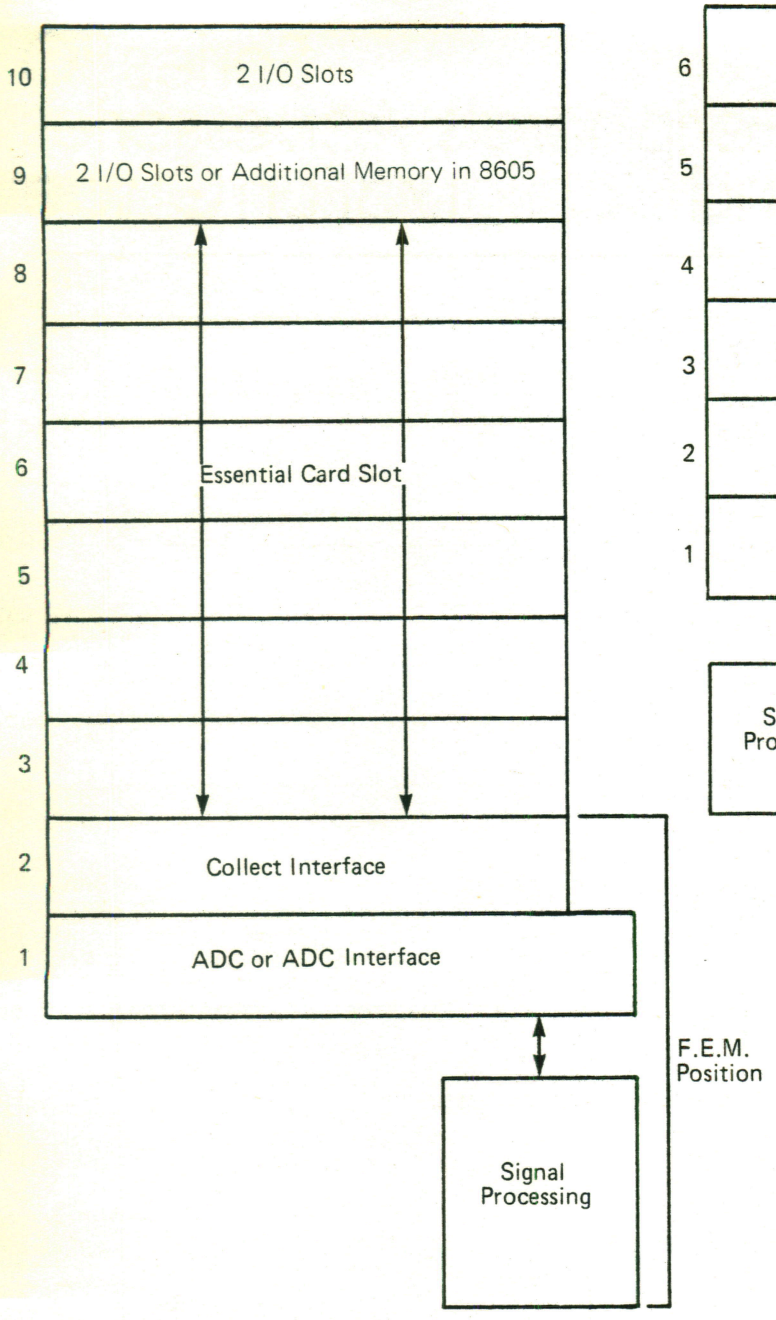



**Diagram 1**
**Chassis Allocation for 8602, 8603 8604, and 8605 Processors**

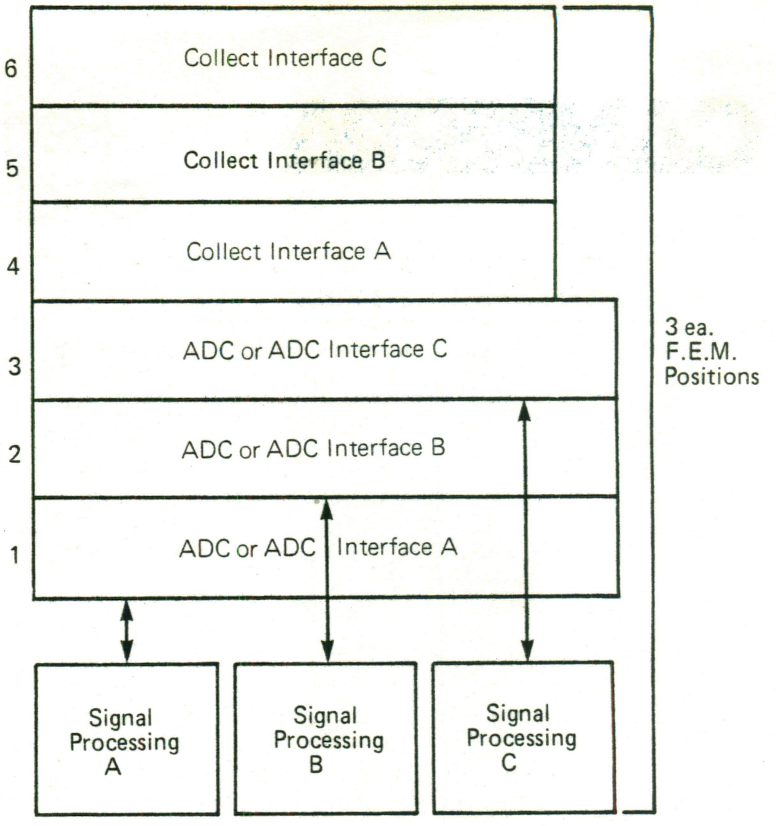



**Diagram 2**
**8683A Chassis Allocation**

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE, MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra/Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottobrunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS12R2 10/78 Printed in U.S.A. 

# CANBERRA 8100/8180 MCA Accessories and Peripherals Price List

| MODEL | | |
|---|---|---|
| 1482-1 | Tag Word Generator | $ 835. |
| 1487 | Paper Tape Scanner | 1,100. |
| 1487D | Paper Tape Punch Driver | 1,100. |
| 5012 | Standby Battery Pack and Power Supply for Semiconductor Memory | 685. |
| 8060 | 100MHz, 8192 Channel ADC (3 wide NIM) | 2,260. |
| 8070 | 50MHz, 8192 Channel ADC (19" Rack Mount, 3.5" high) | 1,525. |
| 8070-01 | PUR/LTC Interface for 8070 | 160. |
| 8070A | 100MHz, 8192 Channel ADC (19" Rack Mount, 3.5" high) | 1,840. |
| 8070A-01 | PUR/LTC Interface for 8070A | 160. |
| 8080 | Fast 8192 Channel ADC (19" Rack Mount, 3.5" high) | 2,575. |
| 8080-01 | PUR/LTC Interface for 8080 | 160. |
| 8110 | Table Top Cover | 80. |
| 8200 | Digital Stabilizer (Requires +6VDC Power Supply, Model 8650) | 1,260. |
| 8210 | Precision Amplitude Pulser (2 wide NIM) | 790. |
| 8220 | Mixer/Router and Cable (for external ADC) (2 wide NIM) | 935. |
| 8220A | Mixer/Router and Cable (for internal ADC) (2 wide NIM) | 935. |
| 8221 | Multi-input MCS Router (2 wide NIM) | 790. |
| 8241 | ADC Time Base (2 wide NIM) | 525. |
| 8420 | ADC Multiplexer (3 wide NIM) | 1,575. |
| 8440A | Dual Parameter Input and Display Control (Requires Option 30) | 3,675. |
| 8441 | Dual Parameter Patch Panel | 630. |
| 8531A | Magnetic Tape Control (7 Track) | 2,365. |
| 8531A/9 | Magnetic Tape Control (9 Track) | 2,890. |
| 8650 | +6VDC Power Supply (2 wide NIM) | 265. |
| ACC-02 | Package of 10 Digital Cassettes | 100. |
| C30A | Polaroid Camera and Adapter | 1,295. |
| CC81 | 8100 Series Carrying Case, with Casters | 595. |
| HC-1 | Hand Held CRT Camera with Polaroid Pack and Hood | 435. |

| TELETYPES AND TERMINALS† | | |
|---|---|---|
| 5101-1 | 3320/3JC ASR33 Teletype with Motor Control and Cable (60Hz, 110V) | $ 1,775. |
| 5101-2 | 3320/3WE ASR33 Teletype with Motor Control and Cable (50Hz, 110V) | 1,785. |
| 5101-3 | 3320/3WE ASR33 Teletype with Motor Control, Cable, and Stepdown Transformer (50Hz, 220V) | 1,820. |
| 5102 | LA36 DECWriter II and Cable | 2,200. |
| 5103 | TI Silent 733 KSR Terminal, including 1 Roll Paper and Cable | 2,285. |
| 5103-1 | TI Silent 733 ASR Terminal with Single Cassette Drive, including 1 Roll Paper, 2 Cassettes, and Cable | 3,500. |
| 5103-2 | TI Silent 733 ASR Terminal with Dual Cassette Drives, including 1 Roll Paper, 2 Cassettes, and Cable | 3,800. |
| 5107-1 | Teletype model 4320-AAK, with Motor Control, Cable, and 1 Box of Paper (50/60Hz, 110V) | 1,400. |
| 5107-2 | Teletype model 4320-AAK, with Motor Control, Cable, 1 Box of Paper, and Stepdown Transformer (50/60Hz, 220V) | 1,450. |
| 5108 | TI Model 743 Silent KSR, including 1 Roll Paper | 1,885. |

| X–Y PLOTTERS† | | |
|---|---|---|
| 5201 | Houston 2200-26 Point Plotter and Cable | $ 2,950. |
| 5202 | HP7004B Point Plotter | 4,355. |

† Non-Canberra manufactured item.

Effective June 4, 1979

## PAPER TAPE I/O†

| | | |
|---|---|---|
| 5301 | Teletype BRPE 100cps Punch and Power Supply | $ 2,250. |
| 5302 | FACIT 4070.0004 75cps Punch and Power Supply | 2,745. |

## MAGNETIC AND CASSETTE TAPE I/O†

| | | |
|---|---|---|
| 5401 | PERTEC 7820-75 7" Reel, 7 Track, 25 ips, 556 BPI, 14kHz | $ 2,665. |
| 5402 | PERTEC 8860-75 10-1/2" Reel, 7 Track, 25 ips, 556 BPI, 14kHz | 3,915. |
| 5403 | PERTEC 7820-9 7" Reel, 9 Track, 25 ips, 800 BPI, 20kHz | 2,665. |
| 5404 | PERTEC 8860-9 10-1/2" Reel, 9 Track, 25 ips, 800 BPI, 20kHz | 3,916. |
| 5406 | Techtran 817 Cassette Unit | 1,685. |

## PRINTERS†

| | | |
|---|---|---|
| 5501 | HPCO5-5055A 10 column, 10 lines/sec with column spacing | $ 3,135. |
| 5502 | Franklin 1200D-10, 10 columns, 10 lines/sec (for 220V specify and add $100) | 3,790. |
| 5503 | Franklin 1240D-10, 10 columns, 40 lines/sec (for 220V specify and add $100) | 4,150. |
| 5504 | Newport 10 columns, 2.8 lines/sec with column spacing | 790. |
| 5505 | Centronics 306 80 column, 100cps with Motor Control and Vertical Format Control (for 50Hz specify - 50 and add $50) | 3,220. |

## CABINETS†

| | | |
|---|---|---|
| 5000 | Floor Cabinet: 67"H x 19"W x 29"D - ID | $ 975. |
| 5001 | Floor Cabinet: 57"H x 19"W x 29"D - ID | 945. |
| 5003 | Floor Cabinet: 49"H x 19"W x 29"D - ID | 735. |
| 5004 | Bench Cabinet: 28"H x 19"W x 29"D - ID | 450. |
| 5005 | System Power Panel | 420. |

† Non-Canberra manufactured item.

F.O.B. Meriden, Connecticut/Minimum Order $50.00/Prices Subject to Change Without Notice.

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE. MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottobrunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS16R3 5/79 Printed in U.S.A. 

CANBERRA

# NIM Price Lis

| | | | |
|---|---|---|---|
| 807 | Pulser | 1 NIM | $ 280. |
| 814 | Preamp/Amp/Disc | 1 NIM | 415. |
| 833 | Baseline Sweep | 1 NIM | 625. |
| 866 | GM Pulse Inverter | | 85. |
| 1407 | Reference Pulse Generator | 2 NIM | 485. |
| 1407P | Pulse Pair Generator | 2 NIM | 790. |
| 1407R | Random Noise Generator | 1 NIM | 680. |
| 1409 | Preamplifier Power Supply | | 370. |
| 1411A-X | DDL Amplifier - Includes 10-turn Pot. on Fine Gain Specify Delay Line Desired (X = 0.2, 0.4, 0.6, 0.8, or 1 microsec delay line) | 1 NIM | 625. |
| 1412 | Research Spectroscopy Amplifier | 3 NIM | 1,570. |
| 1413 | Spectroscopy Amplifier/BLR | 2 NIM | 760. |
| 1427 | ARC Timing | 1 NIM | 1,045. |
| 1428 | Constant Fraction Timing | 1 NIM | 835. |
| 1433 | 100MHz Discriminator | 1 NIM | 660. |
| 1446 | Universal Coincidence | 1 NIM | 390. |
| 1451 | Linear Gate | 1 NIM | 300. |
| 1452 | Linear Gate | 2 NIM | 1,150. |
| 1454 | Linear Gate and Stretcher | 1 NIM | 480. |
| 1457 | Variable Delay Amplifier | 1 NIM | 395. |
| 1461 | Biased Amplifier | 1 NIM | 445. |
| 1465A | Sum-Invert Amplifier | 1 NIM | 230. |
| 1467 | Biased Amplifier | 2 NIM | 1,025. |
| 1468A | Live Time Corrector/Pileup Rejector | 2 NIM | 1,340. |
| 1476A | Blind Scaler (Printing) | 1 NIM | 415. |
| 1480 | Linear Ratemeter | 2 NIM | 465. |
| 1481L | Linear/Log Ratemeter | 2 NIM | 660. |
| 1481LA | Linear/Log Ratemeter, with Alarm | 2 NIM | 710. |
| 1482-1 | Data Input Module, one 6-digit word (1482-4 with four 6-digit words, $1,995.) | 3 NIM | 835. |
| 1483A | Parallel to Serial Converter (TTL Compatible) | 2 NIM | 790. |
| 1485 | Data System Multiplexer | 3 NIM | 1,840. |
| 1487 | Paper Tape Punch Control | 2 NIM | 1,100. |
| 1487D | Paper Tape Punch Driver - Specify 24 or 48 VDC | | 1,100. |
| 1488 | TTY Print Control | 2 NIM | 1,025. |
| 1490C | Blind Timer (Printing) | 1 NIM | 730. |
| 1706 | X-Ray Proportional Counter Preamp | | 270. |
| 1706L | X-Ray Proportional Counter Preamp (50 microsec decay constant) | | 310. |
| 1718 | X-Ray Amplifier/Pulse Height Analyzer | 2 NIM | 955. |
| 1770 | Blind Scaler/Timer (Non-printing) | 1 NIM | 310. |
| 1771 | Scaler (Non-printing) | 2 NIM | 465. |
| 1772 | Counter/Timer (Non-printing) | 2 NIM | 695. |
| 1773 | Scaler (printing) | 2 NIM | 760. |
| 1774 | Dual Scaler (Printing) | 2 NIM | 1,100. |
| 1775 | Nuclear Counter (Printing) | 2 NIM | 1,210. |
| 1776 | Dual Counter/Timer (Printing) | 2 NIM | 1,520. |

| | | | |
|---|---|---|---|
| 1784 | System Data Buffer | 2 NIM | 630. |
| 1786 | Detector $LN_2$ Monitor | 1 NIM | 440. |
| 1788 | Communications Interface | 2 NIM | 1,000. |
| 1790C | Universal Counter/Timer (Printing) | 3 NIM | 1,655. |
| 1795 | Chronometer | 3 NIM | 1,025. |
| AP-1† | 4-Wide Portable NIM Bin/Power Supply | | 630. |
| AP-2† | 6-Wide Portable NIM Bin/Power Supply | | 660. |
| 2000 | NIM Bin/Power Supply | | 730. |
| 2000A | Slave NIM Bin | | 380. |
| 2000P | Power Supply | | 420. |
| 2001 | Spectroscopy Preamplifier, DC Coupled | | 520. |
| 2001A | Spectroscopy Preamplifier, AC Coupled | | 520. |
| 2003(B) | Spectroscopy Preamplifier, Silicon Surface Barrier (2003B for BNC connector) | | 550. |
| 2004 | Spectroscopy Preamplifier, Silicon Surface Barrier | | 290. |
| 2004DM | Direct Mount Version of 2004, for 7400 Vacuum Chamber | | 315. |
| 2005 | Scintillation Detector Preamplifier | | 185. |
| 2005E | Scintillation Detector Preamplifier | | 135. |
| 2006 | Proportional Counter Preamplifier | | 520. |
| 2006E | Proportional Counter Preamplifier | | 295. |
| 2007 | Photomultiplier Tube Base (14-Pin) | | 125. |
| 2007P | Tube Base (14-Pin)/Preamplifier | | 250. |
| 2010 | Spectroscopy Amplifier | 2 NIM | 800. |
| 2011 | Spectroscopy Amplifier | 1 NIM | 615. |
| 2012 | Spectroscopy Amplifier | 1 NIM | 340. |
| 2013 | Spectroscopy Amplifier/Pileup Reject and Live Time Corrector | 1 NIM | 850. |
| 2015A | Spectroscopy Amplifier/Timing SCA | 1 NIM | 625. |
| 2030 | Single Channel Analyzer (LLD, SCA, ULD outputs) | 1 NIM | 315. |
| 2031 | Single Channel Analyzer (SCA output) | 1 NIM | 290. |
| 2032 | Dual Discriminators | 1 NIM | 230. |
| 2035A | Constant Fraction Timing SCA (LLD, SCA, ULD outputs) | 1 NIM | 550. |
| 2036A(S) | Constant Fraction Timing SCA (SCA output) (S = Standard option, add $25.00 per option requested.) | 1 NIM | 500. |
| 2037A(S) | Timing SCA (S = Standard option, add $25.00 per option requested.) | 1 NIM | 405. |
| 2040 | Coincidence Analyzer | 1 NIM | 625. |
| 2043 | Time Analyzer/SCA (TAC/SCA) | 2 NIM | 970. |
| 2044 | Time Analyzer (TAC) | 1 NIM | 730. |
| 2050 | Spectrum Stabilizer | 2 NIM | 1,045. |
| 2055 | Logic Shaper & Delay | 1 NIM | 370. |
| 2058 | Nanosecond Delay | 1 NIM | 290. |
| 2081 | Linear Ratemeter | 1 NIM | 395. |
| 2089 | Serial Scanner/Printer | 4 NIM | 1,350. |
| 2089-01 | 42 Word Buffer Option for 2089 | | 265. |
| 2144A | Fast/Slow Coincidence | 1 NIM | 1,000. |
| 3002 | High Voltage Power Supply; 3000VDC, 10mA | 2 NIM | 625. |
| 3005R | Rack Mount High Voltage Power Supply, 5000V, 1mA | | 730. |
| 3102 | High Voltage Power Supply, 2000V, 2mA | 1 NIM | 520. |
| 3105 | High Voltage Power Supply, 5000V, 100μA | 1 NIM | 520. |

F.O.B. Meriden, Connecticut/Minimum Order $50.00/Price Subject to change without notice.

†Non-Canberra Manufactured Items.

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE, MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra/Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottobrunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS7R2 5/79 Printed in U.S.A. 

CANBERRA

# 8100 Multichannel Analyzer Price List

## PROCESSORS

| | |
|---|---|
| Model 8100-1K Complete 1024 Channel Hardwired MCA, including:<br>Amp/SCA<br>50MHz, 8192 ADC<br>1024 Channel Semiconductor Memory<br>CRT and Power Supply<br>Numeric Readout on CRT<br>Log Display<br>Cursor and Band Control<br>Three I/O Interface Slots | 7,615. |
| Model 8100-2KS Same as 8100-1K, but with 2048 Channel Semiconductor Memory | 8,035. |
| Model 8100-4KS Same as 8100-1K, but with 4096 Channel Semiconductor Memory | 9,505. |
| Model 8100-4K Same as 8100-1K, but with 4096 Channel Core Memory | 10,660. |

## COMPLETE ANALYSIS PACKAGES

| | |
|---|---|
| Model 8100-1K-A Complete 1024 Channel Analysis Package, including:<br>8100-1K 1024 Channel MCA<br>8100-01 Digital Integrator<br>8100-02 Analog Compare<br>8100-03 Digital Energy Calibration | 8,455. |
| Model 8100-2KS-A Complete 2048 Channel Analysis Package, including:<br>8100-2KS 2048 Channel (Semi) MCA<br>8100-01 Digital Integrate<br>8100-02 Analog Compare<br>8100-03 Digital Energy Calibration | 8,875. |
| Model 8100-4KS-A Complete 4096 Channel Analysis Package, including:<br>8100-4KS 4096 Channel (Semi) MCA<br>8100-01 Digital Integrate<br>8100-02 Analog Compare<br>8100-03 Digital Energy Calibration | 10,345. |
| Model 8100-4K-A Complete 4096 Channel Analysis Package, including:<br>8100-4K 4096 Channel (Core) MCA<br>8100-01 Digital Integrate<br>8100-02 Analog Compare<br>8100-03 Digital Energy Calibration | 11,710. |

## OPTIONS

| | | |
|---|---|---|
| 8100-01 | Digital Integrator | $ 210. |
| 8100-02 | Analog Comparison | 265. |
| 8100-03 | Digital Energy Calibration | 790. |
| 8100-04 | Basic Input/Output (Required for all I/O) | 370. |
| 8100-04B | HP 7004B Plotter Cable - Requires 04 | 130. |
| 8100-04C | General X-Y Plotter Cable - Requires 04 | 80. |
| 8100-04D | NIM Readout Cable (8 feet) - Requires 04; (Two (2) Cables Required) | 55. |
| 8100-05 | Teletype Interface - Requires 04 | 265. |
| 8100-05A | Combination TTY and EIA RS232C Interface and Cable - Requires 04 | 475. |
| 8100-05B | TI 733 Interface - Requires 04 | 525. |
| 8100-05C | Centronix 306 Interface and Cable - Requires 04 | 525. |
| 8100-05L | DECWriter Interface and Cable - Requires 04 | 525. |
| 8100-05T | Techtran Cassette Interface and Cable - Requires 04 | 525. |
| 8100-06 | Magnetic Tape Interface and Cable - Requires 04 | 370. |
| 8100-07A | Franklin Printer Interface and Cable - Requires 04 | 370. |
| 8100-07B | HP 5055A or 5050B Printer Interface and Cable - Requires 04, Specify which Printer | 370. |
| 8100-07C | Newport Printer Interface and Cable - Requires 04 | 370. |
| 8100-08 | 4096 Channel Semiconductor Memory (Replaces 1024 Memory Credit issued upon return, Consult Factory) | 2,940. |
| 8100-09 | 4096 Channel Core Memory (Replaces 1024 Memory, Credit issued upon return, Consult Factory) | 4,200. |
| 8100-10 | LIST Mode and Cable | 265. |
| 8100-11 | Mixer-Router Wiring | 160. |
| 8100-12 | Serial Computer Interface Wiring | 265. |
| 8100-13 | Bragg Beam Scanner Wiring | 160. |
| 8100-14 | Serial Computer Interface requires 04, 12 | 2,625. |
| 8100-14X | Serial Computer Interface with X-Ray Marker Generator Requires 04, 12 | 3,150. |
| 8100-15 | 100MHz, 8192 ADC (Replaces 50MHz ADC) | net 265. |
| 8100-16A | FACIT 4070 Punch Interface and Cable - Requires 04 | 370. |
| 8100-16B | Tally 420 Punch Interface and Cable - Requires 04, 1487D | 370. |
| 8100-16C | Tally P1200 Punch Interface and Cable - Requires 04, 1487D | 370. |
| 8100-16D | BRPE Punch Interface and Cable - Requires 04, 1487D | 370. |
| 8100-16E | Tally 424 Reader Interface and Cable - Requires 04 (24 volts only) | 370. |
| 8100-17 | External ADC Interface and Cable (Replaces Internal AMP/SCA/ADC - Specify ADC Connector Type) | 265. |
| 8100-18 | Remote Control Interface and Wiring - Must be factory installed | 475. |
| 8100-30 | Dual Parameter Interface and Wiring - Requires 4096 Channel Memory (Replaces Internal AMP/SCA/ADC) | 525. |
| 8100-31 | Live Time Correction - for use with 2013 AMP/PUR | 160. |
| 8100-32 | Service Kit, including Schematics, Extender Boards, and Manual | 80. |

F.O.B. Meriden, Connecticut/Minimum Order $50.00/Prices subject to change without notice.

CANBERRA

CANBERRA INDUSTRIES, INC., 45 GRACEY AVE, MERIDEN, CT. 06450 U.S.A.
Canberra Instruments Ltd., Reading, Berkshire, United Kingdom
Canberra/Positronika N.V., Ninove, Belgium, and B.V., Eindhoven, Netherlands
Canberra-Stolz A.G., Widen-Mutschellen, Switzerland
Canberra Elektronik Gmbh, Ottobrunn, and Frankfurt, West Germany
Canberra Instrumentation, S.A.R.L., Paris, France
Canberra Elektronik, Vienna, Austria

PS13R3 5/79 Printed in U.S.A. 

# CANBERRA

# Series 80 Price List

## SERIES 80 PROCESSORS

| | | |
|---|---|---|
| | Free-standing units; specify suffix RM for rack mount | |
| 8602A | Advanced 2048 Channel Series 80 Processor, including:<br>.12" (30cm) CRT with Dual Cursors, Autoranging Linear, Square Root, and Log Display<br>.Front End Module Mounting Slot<br>.Terminal Interface (TTY and EIA)<br>.Four (4) I/0 Interface Slots<br>.Model 8641 Peak Analysis: Integral, Peak Net Area, Peak Search, and 2nd Order Energy Calibrate<br>.Model 8642 Data Manipulation: Smooth, Fractional Strip, Ratio, and Normalization<br>.Model 8645 Learn/Execute: Sample Changer Control, 7 Each 32 Step Program RAMs, Program Editing, Program I/O, and Program Chaining | $8,900 |
| 8603A | Advanced 4096 Channel Series 80 Processor, as above | 9,400 |
| 8604A | Advanced 8192 Channel Series 80 Processor, as above | 10,400 |
| 8605A | Advanced 16,384 Channel Series 80 Processor, as above, with two (2) I/O Interface Slots | 12,400 |

## MEMORY

| | | |
|---|---|---|
| 8612 | 4096 Channel Data Memory, Including 4K byte scratchpad memory. Replaces existing memory. Credit issued upon return to factory. | 1,550 |
| 8613 | 8192 Channel Data Memory, as in 8612 above | 1,950 |
| 8614 | 16,384 Channel Data Memory, as in 8612 above | 3,650 |

## ADCs AND SIGNAL PROCESSING UNITS

ADC board and interface mount internal to 8600 Processor or 8683A Expansion Chassis. ADC controls and signal processing are on front panel unit (Signal Processing Unit).

### Front End Modules (ADC, Collect Interface and Signal Processing Unit)

| | | |
|---|---|---|
| 8621 | ADC/SCA. Includes 100MHz, 8192 Channel ADC, DMA interface, and Independent SCA | 1,500 |
| 8622 | PHA/MCS. Includes all features of 8621 plus 20MHz MCS inputs and Amplifier with BLR. | 2,500 |

## ADCs AND SIGNAL PROCESSING UNITS (continued)

| | | |
|---|---|---|
| 8623 | PHA/LTC. Includes all features of 8621 plus Spectroscopy Amplifier, Baseline Restorer, Pulse Pileup Rejector, and Live Time Corrector | $ 2,500 |
| 8624 | ADC/Gated Mixer Router. Includes all features of 8621 plus a 4-input mixer/router with independent live or true time and linear gate for each input. Capability of 1,2 or 4 spectra (any spectrum size up to 8192 channels per spectrum if enough memory in processor). | 2,750 |

**Signal Processing Units (No ADC or Collect Interface. Can be exchanged with any other Signal Processing Unit by removing top cover and unplugging)**

| | | |
|---|---|---|
| 8622A | Signal Processing Portion Only of 8622 | 1,250 |
| 8623A | Signal Processing Portion Only of 8623 | 1,250 |
| 8624A | Signal Processing Portion Only of 8624 | 1,500 |

**External ADC Interface**

| | | |
|---|---|---|
| 8633 | External ADC Interface. Allows an external Canberra ADC (8040,8060,8070,8070A,or 8080) to be used with the 8600 Processor or 8683A Expansion Chassis. | 750 |

## ANALYSIS OPTIONS

Mount in master ROM card in 8600 Processor.
Consult factory for field installation procedure.

| | | |
|---|---|---|
| 8641 | Peak Analysis Option. Includes 2nd-Order Energy Calibrate, Peak Search, Peak Net Area, and % Error. | * |
| 8642 | Data Manipulation Option. Includes Smooth, Fractional Strip, Ratio and Normalization. | * |
| 8643 | Isotope Identification Option. Includes Library Input/Output, Library Scanning, Isotope Identification, Standard ROM Library, and RAM Library for User Generated Isotope Libraries. Requires 8641. | 750 |
| 8644 | Quantitative Isotopic Analysis Option. Includes Efficiency Calibration, Quantitative Isotopic Analyses, and Efficiency Table I/O. Requires 8641 and 8643. | 950 |
| 8645 | Learn/Execute Option. Includes Sample Changer Control, 7 each 32 Step Program RAMs, Program Editing, Program I/O, and Program Chaining. | * |

## I/O INTERFACES

**Plotter**

| | | |
|---|---|---|
| 8651 | X-Y Plotter Interface (Single I/O Slot) | 450 |
| 8651-B | HP7004B Plotter Cable | 125 |
| 8651-C | General Purpose X-Y Plotter Cable | 95 |

*Included as standard features in Model 8600A (Advanced) Processors. Consult factory for cost to retrofit to standard 8600 Processors.

## I/O INTERFACES (continued)

### EIA

| | | |
|---|---|---|
| 8652-X | Single EIA Interface (Single I/O Slot) | 450 |
| 8653-XX | Dual EIA Interface (Single I/O Slot) Model number suffix X or XX must be specified at time of order. | 750 |

| X | INTERFACE |
|---|---|
| A | Model 5204 HP7221A Graphics Plotter |
| B | Model 5308 FACIT 4070 Punch with EIA Interface |
| C | Model 5309 FACIT 4021 Reader with EIA Interface |
| D | Model 5405 Techtran Cassette |
| E | Model 5411 Digital Cassette |
| F | Model 5505 Centronix Printer |
| G | Model 5109 LA120 or Model 5112 LA38 Terminals |

### Mass Storage

| | | |
|---|---|---|
| 8661 | Industry Compatible Magnetic Tape Interface, Controller and Cable (Single I/O Slot) | 2,950 |
| 8662-R | Dual Floppy Disk with Interface, Controller, and Cables (Single I/O Slot) (10.5"H). Rack Mount Version. Specify 8662-F for free-standing unit. | 4,950 |

### Computer

| | | |
|---|---|---|
| 8671 | JUPITER Computer Networking Interface (9.6K baud) (Single I/O) | 1,950 |
| 8673 | JUPITER Computer Networking Interface (300 to 57.6K baud). (Single I/.O Slot)(Requires 8645 Learn/Execute, and 8673C or 8673V Interface Card in the Computer) | 2,750 |
| 8673V | Q-BUS Interface for JUPITER | 1,050 |
| 8673C | UNIBUS Interface for JUPITER | 1,050 |

## MISCELLANEOUS

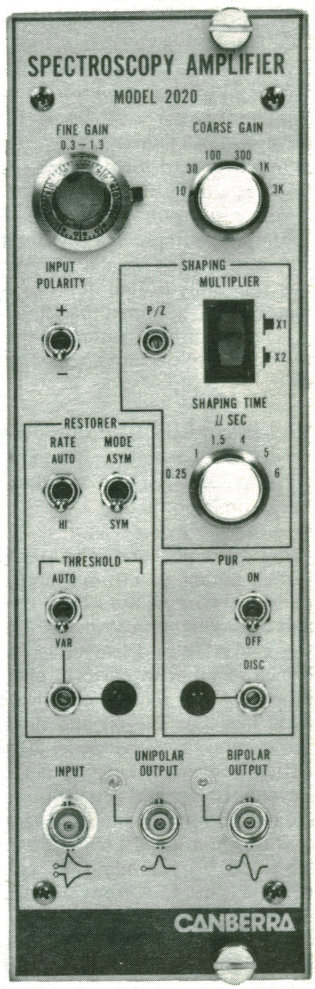
| | | |
|---|---|---|
| 8625 | Digital Stabilizer Wiring for 8600 Processor. Permits stabilization of the ADC's in models 8621, 8622, 8623, or 8624 via the 8200 Digital Stabilizer | 250 |
| 8626 | Digital Stabilizer Wiring for the 8683A Expansion Chassis. Permits stabilization of the ADC's in models 8621, 8622, 8623, or 8624 via the 8200 Digital Stabilizer (one 8200 required per Front End Module.) Wiring included for all three (3) Front End Module positions. | 750 |
| 8681 | Memory Protection Power Supply. Protection time varies with memory size. | 950 |
| 8683A | Series 80 Expansion Chassis and Power Supply. Provides 3 Front End Module Positions, 14" High Rack Mount Unit, Cable Driver and Cable. (See Diagram #2). | 1,950 |
| 8685A | Service Kit. Includes Schematics, Card Extenders, and instructions. | 425 |
| 8686 | Rack Mount Adapter Kit (Required to convert existing Table Mount to Rack Mount) | 150 |
| HC-3 | Hand Held CRT Camera with Polaroid Pack and Series 80 Hood | 750 |

CANBERRA

# Model 2020
# Spectroscopy Amplifier

## Features

- 12 front panel selectable shaping time constants
- Noise ⩽3.4μV RMS referred to input at gain ⩾100 and 3μsec shaping
- DC drift ⩽±10μV/°C
- Unique active baseline restorer with:
  1. Automatic or fixed restorer rates
  2. Automatic or manual threshold adjustment
  3. Selectable symmetry for excellent high count rate performance
- Accommodates pulsed optical feedback preamplifiers
- Leading and trailing edge pulse pileup rejection
- Live time correction for pulse pileup and amplifier dead time




## Description

The Canberra Model 2020 Spectroscopy Amplifier offers the modern spectroscopist more performance, features and flexibility than any other nuclear pulse amplifier available today. Functionally, the Model 2020 provides in a double width NIM module an exceptional spectroscopy amplifier, a gated active baseline restorer, a pulse pileup rejector and a live time corrector.

Canberra's near-Gaussian filter shaping, well known and now emulated by others in the industry, has been refined in the Model 2020 for improved pulse symmetry, minimum sensitivity of output amplitude to variations in detector rise time, and maximum signal to noise ratio. For a given shaping time constant, the improved pulse symmetry minimizes the pulse dwell time by tucking in the trailing skirt of the unipolar pulse shape. This allows a faster return to the baseline. The result is superior energy resolution, count rate and throughput performance. Figure 1 illustrates typical noise verses shaping time constant and Figure 2 demonstrates typical resolution and peak shift performance verses count rate. Unipolar shaping is achieved with one differentiator and two active filter integrators. The differentiator is placed early in the amplifier to insure good overload recovery. The integrators are placed late to minimize noise contribution from the gain stages. The amplifier offers 12 front panel switch selectable pulse SHAPING time constants of 0.25, 0.5, 1, 1.5, 2, 3, 4, 5, 6, 8, 10 and 12μsec.

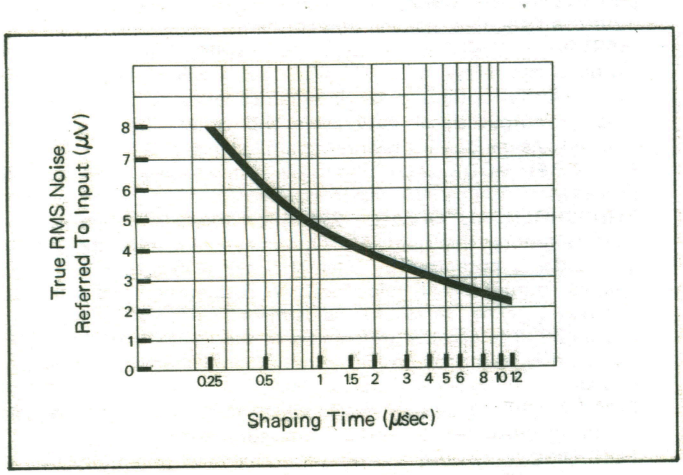



**Figure 1.**
Typical Model 2020 Unipolar Output True RMS Noise (referred to input for gain of 100) vs. Shaping Time constant.

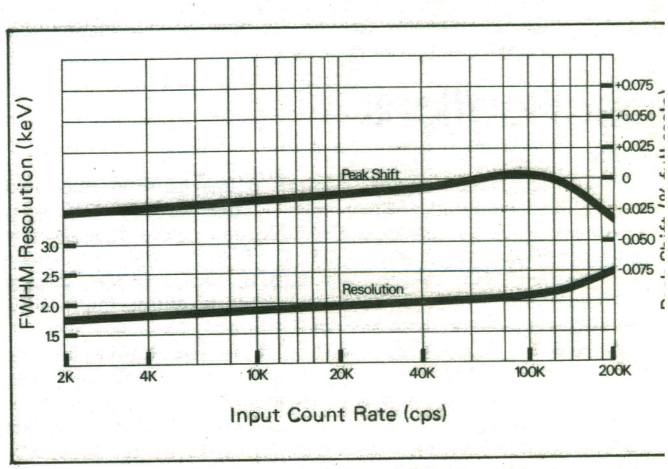



**Figure 2.**
Typical Model 2020 Resolution and Peak Shift Stability vs. Counti Rate for 2 μsec shaping, AUTO Restorer Rate, AUTO Resto Threshold, ASYM Restorer Mode and a 1.33 Mev Co-60 Gamma Pe

Canberra Industries, Inc. 45 Gracey Ave. Meriden, Connecticut 06450 Tel. 203-238-2351 TWX: 710-461-0192 Cable: CANBERR

# Description (continued)

The Canberra gated DC restorer offers automatic features on both the restorer threshold and restorer rate assuring the best possible low and high count rate performance. Amplifier performance is very much dependent on the restorer rate and threshold settings. The Model 2020 includes circuitry which automatically and continuously samples the amplifier output noise and count rate, and automatically sets the respective restorer threshold and rate with precision for optimum performance. The restorer is also flexible. The discriminating researcher can overide the automatic restorer features. Setting the RESTORER RATE and THRESHOLD switches to their manual positions HIgh and VARiable respectively allows manual operation of the restorer. A front panel LED is provided as a user aid when setting the restorer threshold manually. The flexibility of the restorer is further enhanced by providing SYMmetrical or ASYMmetrical restorer selection. The symmetrical restorer mode is used for detector systems which exhibit baseline discontinuities resulting from excessive noise and/or high voltage effects, preamp reset pulses and preamp secondary time constants. The asymmetrical restorer mode virtually eliminates charge accumulation and correlated noise on the restorer holding capacitor. This restorer mode is especially suited for use with high resolution detector systems that exhibit minimal baseline discontinuities and whose signals have a clean monotonic return to the baseline. The result is superior resolution/count rate performance when compared to more conventional methods.

Simultaneous UNIPOLAR and BIPOLAR outputs are available at both front and rear panel BNC connectors. The unipolar signal can be delayed 2μsec, or with the 2020-4 option by 4μsec. The bipolar output can be used for counting, timing or gating.

The internal live time corrector and pileup rejector provides the capability of quantitative gamma spectrum analysis nearly independent of system count rate. By connecting the ADC's Linear Gate ($\overline{LG}$) signal to the Model 2020 and connecting the Model 2020's REJECT and Dead Time ($\overline{DT}$) signals to the ADC and live timer, the Model 2020 and associated ADC interface together to perform pileup rejection and live time correction. Canberra ADCs require option 01 to operate in this manner (see ADC Interface Section on the next page). During the amplifier and ADC processing time, the Model 2020 inspects for pileup and permits the ADC to convert only those detector signals resulting from a single energy event. To compensate for pulses rejected, amplifier and ADC dead times, a system dead time is generated by the live time correction function. The system dead time is the composite dead time of the ADC and Model 2020, extending the collection time by the appropriate amount. See Figure 4. A front panel LED is provided as a user aid when setting the PUR DISCriminator.

The Model 2020's exceptional DC stability and ultra low noise ensure that optimum performance is realized. Together with its broad gain range (X3 to X3900), 12 shaping time constants, pileup rejection and live time correction the Model 2020 offers uncompromising performance when used with Germanium, Silicon, Scintillation, Gas Proportional and Surface Barrier detectors.

# Specifications

## INPUTS

**INPUT** - accepts positive or negative pulses from an associated preamplifier; amplitude: ± 10 volts ÷ selected gain, ± 12 volts maximum; rise time: less than SHAPING time constant; decay time constant: 40 μsec to ∞ for 0.25, 0.5, 1, 1.5, 2, 3, and 4 μsec shaping time constants, 100 μsec to ∞ for 5, 6, 8, 10 and 12 μsec shaping time constants; input impedance: ≈ 1 k ohms; input BNC connectors located on front and rear panel.

**$\overline{LG}$** - receives a negative logic pulse from the ADC. Used to indicate to the Model 2020 that the ADC has accepted and is processing an event; input is TTL compatible, logic low when ADC accepts input, returning to a logic high at the conclusion of the ADC acquisition cycle; loading: 4.7 k ohm pull up resistor; input pulse rise time to be <350 nsec. Accessible through rear panel PUR Connector.

**PUR INHIBIT** - receives a logic pulse from associated pulsed optical feedback preamplifier used to extend the Model 2020 $\overline{DT}$ signal, inhibit and reset the pileup rejector during the preamplifier's reset cycle; internal jumper provides the option of either INB (positive true) or $\overline{INB}$ (negative true) logic pulses; INB $V_{HI}$ (true): 2 to 5 volts; $V_{LO}$: 0 to 1.5 volts; $I_{HI}$: 3.2 mA at 3 volts; $\overline{INB}$ $V_{LO}$ (true): 0 to 1 volt, $V_{HI}$: 2.5 to 5 volts, $I_{LO}$: -3.6 mA at 0 volts; BNC connector located on rear panel.

## OUTPUTS

**UNIPOLAR OUTPUT** - provides positive linear active filter near-Gaussian shaped pulses; amplitude linear to + 10 volts, 12 volts max.; D.C. restored; output D.C. level factory calibrated to 0 ± 5mV, front panel output impedance less than 1 ohm or ≈93 ohms internally selectable; rear panel output impedance ≈93 ohms; short circuit protected; prompt or delayed 2μsec (4μsec with 2020-4 option); BNC connectors located on front and rear panels.

**BIPOLAR OUTPUT** - provides prompt positive lobe leading linear active filter bipolar shaped pulses; amplitude linear to + 10 volts, 12 volts max., negative lobe is approximately 70% of positive lobe; D.C. coupled; output D.C. level ± 25mV; front panel output impedance less than 1 ohm or ≈93 ohms, internally selectable; rear panel output impedance ≈ 93 ohms; short circuit protected; BNC connectors located on front and rear panels.

**$\overline{DT}$** - provides a negative logic signal and when "OR"ed together with the ADC dead time, at the ADC's live timer, provides live time correction for the amplifier and pileup rejector. Output is TTL compatible, open collector with 1k pull up resistor through 47 ohm output resistor. Logic low when system is busy, logic high otherwise. BNC connector located on rear panel.

**REJECT** - provides a logic signal used to initiate an ADC reject sequence for corresponding piled up input events that occur during the ADC's Linear Gate ($\overline{LG}$) time; internal jumper provides the option of either REJ (positive true) or $\overline{REJ}$ (negative true) logic pulse. TTL compatible, totem pole output through 47 ohm resistor. Accessible through rear panel PUR Connector.

## FRONT PANEL CONTROLS

**COARSE GAIN** - 6 position rotary switch selects gain factors of X10, X30, X100, X300, X1000 and X3000.

**FINE GAIN** - ten-turn locking dial precision potentiometer selects variable gain factor of X0.3 to X1.3 resetability ≤0.03%.

**INPUT POLARITY** - 2 position toggle switch to set the Model 2020 for the polarity of the incoming preamplifier signal.

**P/Z** - 22-turn screwdriver pole zero potentiometer to optimize amplifier baseline recovery and overload performance for the preamplifier fall time constant and the Model 2020's pulse shaping chosen; 40 μsec to ∞ for 0.25, 0.5, 1, 1.5, 2, 3 and 4 μsec SHAPING time constants, 100 μsec to ∞ for 5, 6, 8, 10 and 12 μsec SHAPING time constants.

**SHAPING TIME** - 6 position rotary switch; provides 0.25, 1, 1.5, 4, 5 and 6μsec basic shaping time constants.

**MULTIPLIER** - multiplies SHAPING TIME setting by X1 or X2 giving additional shaping time constants of 0.5, 2, 3, 8, 10 and 12μsec, a total of 12 shaping time constants.

**RESTORER RATE** - 2 position toggle switch to set the baseline restorer rate (slew rate); AUTO: the baseline restorer rate is automatically optimized by internal circuitry as a function of unipolar output signal duty cycle and count rate; High: when selected sets the baseline restorer to a fixed high rate.

**RESTORER MODE** - 2 position toggle switch to select SYMmetrical or ASYMmetrical baseline restorer modes.

**THRESHOLD AUTO/VAR** - 2 position toggle switch to set the baseline restorer threshold; AUTO: the baseline restorer threshold is automatically optimized by internal circuitry as a function of the unipolar output signal noise level; VARiable: provides a manual variable baseline threshold adjustment range of 0 volts to 200mVDC. The negative (referenced to the UNIPOLAR OUTPUT) threshold is set at -500mVDC. An LED indicator is provided as a user-aid for set up convenience.

**PUR ON/OFF** - 2 position toggle switch to enable (ON) or disable (OFF) the pileup rejector and live time corrector.

**PUR DISC** - 22 turn screwdriver adjustment potentiometer for optimizing the pileup rejector discriminator threshold level. Provides a variable range of 0 to 550mV. An LED indicator is provided to aid the user when setting the PUR DISC just above the system noise.

## INTERNAL CONTROLS

**UNIPOLAR DELAY** - 2 jumper plugs provided to select UNIPOLAR output to prompt (OUT) or delayed 2μsec (IN), or 4μsec on option 2020-4. Shipped in the prompt (OUT) position.

**UNIPOLAR $Z_{out}$** - jumper plug provides $Z_{out} \leqslant 1$ ohm or ≈93 ohms for the front panel UNIPOLAR output. Shipped in the ≤1 ohm position.

**BIPOLAR $Z_{out}$** - jumper plug provides $Z_{out} \leqslant 1$ ohm or ≈93 ohms for the front panel BIPOLAR output. Shipped in the ≤1 ohm position.

**INB/$\overline{\text{INB}}$** - jumper plug J5 allows the PUR INHIBIT input to accept either positive true or negative true logic signals. Shipped in the INB (positive true) position.

**REJ/$\overline{\text{REJ}}$** - jumper plug J6 allows the reject output to be a positive true or negative true logic signal. Shipped in the REJ (positive true) position.

## PERFORMANCE

### AMPLIFIER

**GAIN RANGE** - continuously variable from X3 to X3900, product of COARSE and FINE GAIN controls.

**OPERATING TEMPERATURE RANGE** - 0 to 50°C.

**GAIN DRIFT** - ≤±0.0075%/°C.

**DC LEVEL DRIFT** - UNIPOLAR output: ≤±10μV/°C; BIPOLAR output: ≤±50μV/°C.

**INTEGRAL NON-LINEARITY** - ≤±0.05%, over total output range for 2μsec shaping.

**CROSSOVER WALK** - BIPOLAR output: ≤± 3nsec for 50:1 dynamic range and 2μsec shaping when used with Canberra Model 2037A Edge/Crossover Timing Single Channel Analyzer.

**OVERLOAD RECOVERY** - UNIPOLAR (BIPOLAR) output recovery to within ± 2% (1%) of full scale output from X1000 overload in 2.5 (2.0) non-overloaded pulse widths, at full gain, any shaping time constant and pole-zero cancellation properly set.

**NOISE CONTRIBUTION** - ≤3.4μV true RMS UNIPOLAR (5.9μV BIPOLAR) output referred to input, 3μsec shaping and amplifier gain ≥100.

**PULSE SHAPING** - near-Gaussian shape: one differentiator (two for bipolar), two active filter integrators; UNIPOLAR time to peak: 2.35X shaping time; pulse width: 6.8X shaping time; BIPOLAR time to crossover: 2.8X shaping time, time to peak, pulse width and crossover times measured at 0.1% of full scale output; 1 μsec SHAPING center frequency: 150 kHz; band width: 180 kHz; $f_c$ and BW for other shaping are multiples of that given for 1 μsec.

**RESTORER** - active gated.

* **SPECTRUM BROADENING** - the FWHM of a Co-60 1.33 MeV gamma peak for an incoming rate of 2kcps to 100kcps and a 9 volt pulse height will typically change less than 14% for 2μsec shaping, AUTO Restorer Rate, AUTO Restorer Threshold and ASYM Restorer Mode.

**COUNT RATE STABILITY** - the peak position of a Co-60 1.33 MeV gamma peak for an incoming count rate of 2kcps to 100kcps and a 9 volt pulse height will typically shift less than 0.024% for 2μsec shaping, AUTO Restorer Rate, AUTO Restorer Threshold and ASYM Restorer Mode.

* Note: These results may not be reproducible if associated detector exhibits an inordinate amount of long rise time signals.

### PILEUP REJECTOR/LIVE TIME CORRECTOR

**PULSE PAIR RESOLUTION** - ≤500nsec.

**MINIMUM DETECTABLE SIGNAL** - Limited by detector/preamp noise characteristics.

**ADC INTERFACE** - Compatible Canberra ADC's (with factory installed options) are available and can be ordered using the following designations:

Model 8070 with Option 01
Model 8070A with Option 01
Model 8080 with Option 01
Model 8100 (MCA) with Option 31

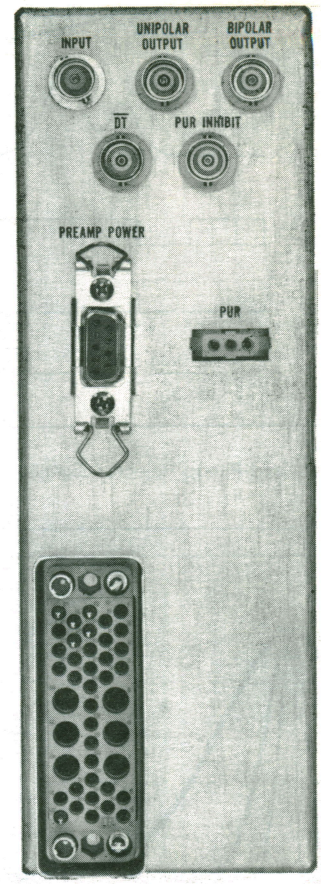
For use with existing systems, detailed instructions are provided in the 2020 manual to allow the user to adapt his ADC to interface with the Model 2020 for pileup rejection and live time correction.

## POWER REQUIREMENTS

| | |
|---|---|
| +24VDC — 90mA | +12VDC — 145mA |
| - 24VDC — 130mA | - 12VDC — 60mA |

## CONNECTORS

With the exception of the PUR and PREAMP POWER connectors,




**PUR** - Molex receptable #03-06-2032 mating cable plug supplied as an accessory.

**PREAMP POWER** - rear panel, Amphenol, type 17-10070.

**ACCESSORIES** - Molex cable plug #03-06-2032 and 3 associated male pins #02-06-2132.

## PHYSICAL

**SIZE** - standard double-width NIM module 2.70 x 8.71 inches (6.85 x 22.13 cm) per TID-20893 (rev.).

**NET WEIGHT** - 2.9 lbs. (1.3 kgs).

**SHIPPING WEIGHT** - 5.0 lbs. (2.3 kgs).

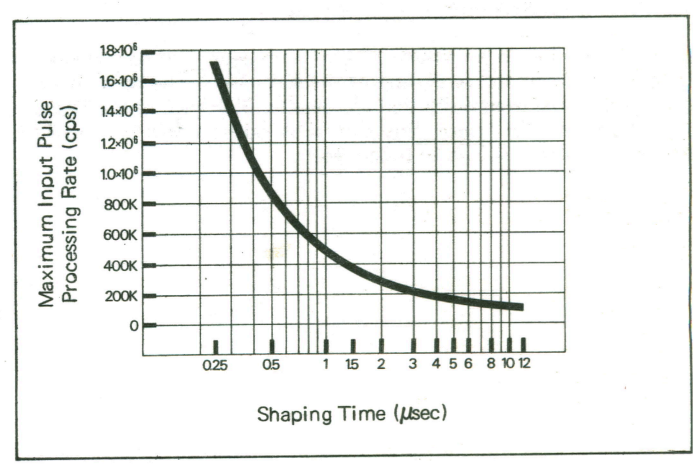



**Figure 3.**
Typical Model 2020 Maximum Input Pulse Processing Rate verses shaping time constant.

* Maximum Input Pulse Processing Rate: Maximum amplifier input count rate (pulses per second) for which the amplifier's DC restorer

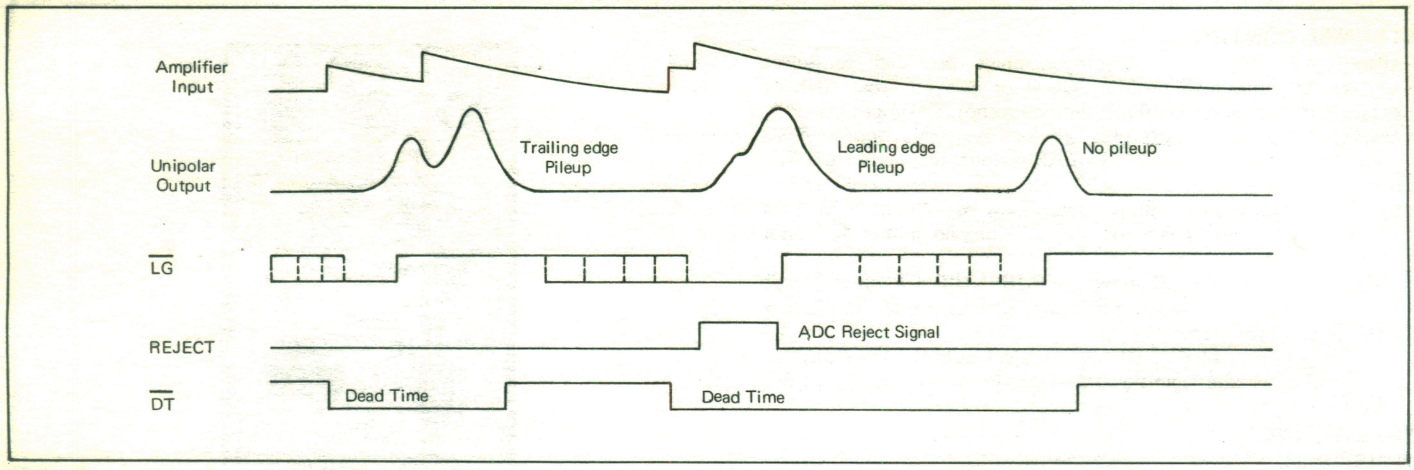



**Figure 4.**
Relationship of Amplifier and Pileup Rejector Signals.

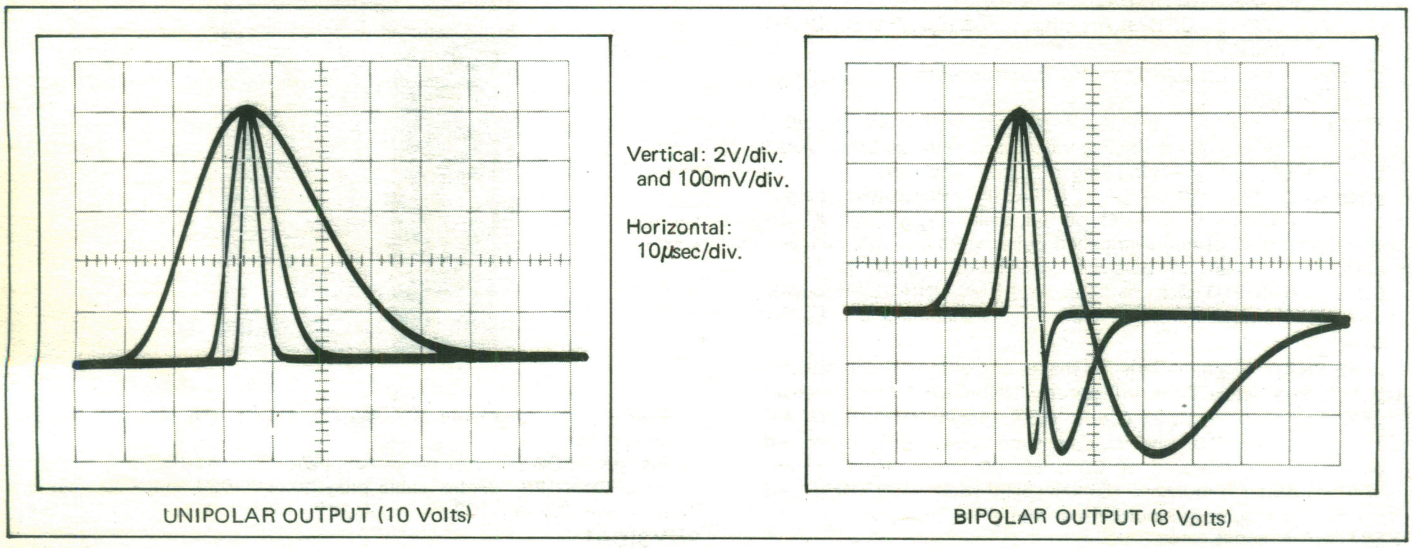



**Figure 5.**
Model 2020 SHAPING selected for 12, 4 and 1.5 μsec.

During the amplifier and ADC processing time, the Model 2020 inspects for pileup and permits the ADC to convert only those detector signals resulting from a single energy event, see Figure 6.

Note the reduction in amplitude of both sum peaks and background. Also note the improved resolution of the sum peaks. The background reduction and improved resolution are directly indicative of the Pileup Rejector's capabilities, since only sum peak pulses which are indeed 100% in coincidence should be processed.

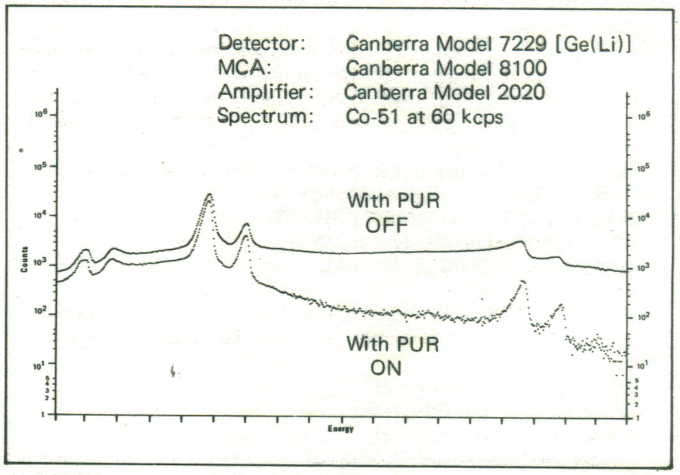



**Figure 6.**
Co-57 spectrum at 80 kcps and 4 μsec shaping.

S116R1M5 2/80 Printed in U.S.A.

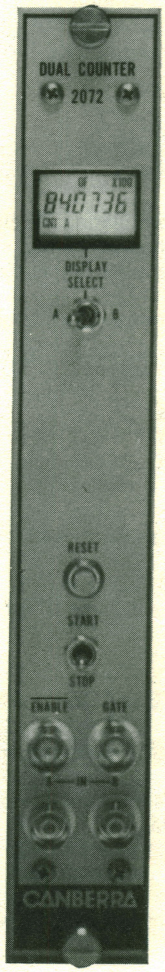
CANBERRA

Represented by:
PULCIR, INC.
P. O. BOX 357
OAK RIDGE, TN 37830
PHONE 615/483-6358

# Model 2072 Dual Counter

## Features

- IEEE - 488 (GPIB) Bus
- 100 MHZ count capability for positive and negative inputs
- 8 Decade count capacity, both channels
- Operates as a dual counter
- Liquid crystal display with annunciators
- Daisy chain compatible
- Single width NIM




## Description

The Canberra Model 2072 Dual Counter provides, in a single-width NIM module, two eight decade counters. Both count inputs accept positive TTL voltage or negative NIM-current logic inputs at rates to 100 MHz without polarity switching or jumper changes.

Display of either counter's content is accomplished with a six digit Liquid Crystal Display. The LCD includes eight annunciators which describe the display and dynamic state of the unit. Automatic x 100 range shift provides an indication of the six most or six least significant digits.

Master-Slave system operation can be accomplished via the front panel interconnection of the ENABLE signal, or by either of the two optional I/O Interfaces.

The Canberra Daisy Chain NIM option provides interfacing to all existing Canberra printing counters, timers, and readout scanners.

The Canberra GPIB (IEEE-488) option provides interfacing to a GPIB bus and allows a GPIB Controller to start, stop, and readout counting systems.

A convenient ENABLE output will allow the Model 2070 to START, STOP, and RESET single or multiple combinations of other Canberra Series 2000 Counting Modules.

Internal jumpers can change the impedance of the count inputs for positive voltage pulses from 1k ohms to 50 ohms. This permits termination of cables from equipment that do not source match the coax, and prevents reflections from causing multiple counting.

Other jumpers prevent the resetting of channel A when the module starts counting. This allows accumulation of data in channel A. Gating may also be selected by jumpers to gate both channel A and B, just channel A, or just channel B.

External connection to the GATE input will permit gating of incoming count or time pulses. The gate provides one microsecond resolution. Thus when a system-busy signal is connected to this input, the 2072 will provide extremely accurate dead-time corrections.

## Specifications

**INPUTS**

A and B IN - Positive NIM logic (> +2.0 volts and < +6 volts peak, width > 5 nsec) or negative NIM logic (> -0.6 volts and < 1.6 volts peak, width > 4 nsec); input rise and fall time 1 nsec to 300 nsec; $Z_{in}$ = 1k ohm dc for positive signals (selectable by internal jumper to 50 ohms); $Z_{in}$ = 50 ohms dc for negative signals.

GATE - Counting control for channels A, channel B, or both (selectable by internal jumpers); +4 to +5 volts or open circuit allows counting; zero to +0.8 volts inhibits counting; $Z_{in}$ = 100k ohms to +5 volt bus.

ENABLE - (Bidirectional) as input; zero to +0.8 volt level enables counting mode; +4 to +5 volts or open circuits disables counting mode; $Z_{in}$ = 4.7k ohm to 5 volt bus.

**OUTPUTS**

ENABLE - (Bidirectional) as output; zero to +0.8 volt level indicates counting mode enabled and provides control of count mode to other modules; +4 to +5 volt level indicates counting mode disabled; sinks 20 mA, sources from 4.7k ohm to +5 volt bus.

OVERFLOW - + 5 volt pulse at reset of eighth decade; rise time or fall time less than 200 nanoseconds, width 0.3 microseconds; dc coupled; sinks 5 mA, sources 2.5 mA at 2.5 V; rear panel BNC connector; jumper determines source, A or B.

**FRONT PANEL CONTROLS**

START/STOP - Two-position-momentary toggle switch initiates or terminates a counting sequence.

RESET - Manual push button resets both counters to zero.

A/B DISPLAY SELECT - Two-position toggle switch selects which counter's contents are displayed on the LCD.

# Specifications(continued)

**PERFORMANCE**

CAPACITY - Eight decades per channel, allowing $10^8$-1 counts each.
COUNT RATE - 100 MHz max, positive or negative.
PULSE PAIR RESOLUTION - 10 nanoseconds
TEMPERATURE OPERATING RANGE - 0 to 50°C

**INDICATORS**

Six-digit Liquid Crystal Display with auto (x100) shift for displaying six most-significant digits. Five annunciators on LCD describe display. These are: OF (overflow), x100, CNT, A, B. Active counting is indicated by CNT blinking. Leading zeroes are suppressed.

**INTERNAL CONTROLS**

STANDARD JUMPERS

- Clamp input A and B to +5 volts.
- Change input impedance of A and B to 50 ohms for positive inputs.
- Provide for gating channel A, channel B, or both.
- Inhibit reset of channel A when starting. In this mode channel A accumulates counts and is reset only by the manual push button.
- Select overflow output from channel B. This is normally from channel A.
- Allow a pulse on $\overline{\text{ENABLE}}$ INPUT to start the module.

**POWER**

| | |
|---|---|
| +12 | 75 mA |
| - 12 | 80 mA |
| +24 | 35 mA |
| - 24 | 0 |

**PHYSICAL**

SIZE - Standard single width NIM module 3.43 x 22.13 cm (1.35 x 8.71 inches)
NET WEIGHT - 0.91 kgs (2 lb)
SHIPPING WEIGHT - 3.2 kgs (7 lb)

## OPTION 2072-01
## GPIB [IEEE 488] INTERFACE

**FEATURES**

- Asynchronous ASCII data transmission, bit parallel, character serial
- Uniquely addressable, switch controlled
- Talk/Listen mode
- Talk only mode
- Auto recycle minimizes readout dead time
- Field installable
- Form feed or carriage return at end of word

**DESCRIPTION**

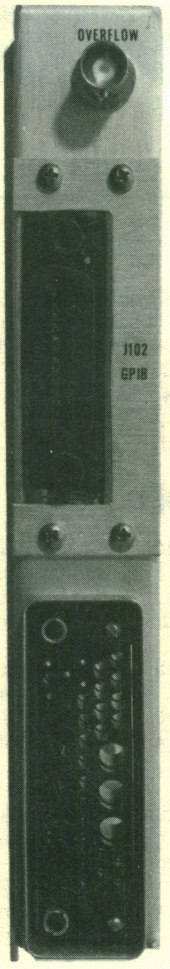
The General Purpose Interface Bus links a Canberra NIM counting module into the IEEE 488 standard communications network. As a Listener this interface receives Start, Stop, and Readout commands from a controller. As a Talker it supplies its accumulated data to a peripheral device. A Talk Only mode provides a controllerless means for a single module to read out to a peripheral Listener. The Auto Recycle mode allows the selected module to place itself (and the rest of the Canberra counting system) back into the count mode at the conclusion of its readout, thus minimizing system dead time. A side panel cutout provides access to Set/Verify a Talk/Listen Address, select Talk Only mode, enable Auto Recycle, or select form Feed/Carriage Return at the end of a word. This interface is a single PC Board with a connector that allows convenient field installation.

**SPECIFICATIONS**

**SIGNALS** - The input/output signals on the GPIB connector are TTL compatible. True equals 0 to 0.4 volts, False equals +2.5 to +5 volts.

**CONTROLS** - Side-panel cutout provides acess to:

- Address select switches (5)
- Talk/Listen/Talk Only switch
- Auto Recycle switch
- FF/CR Switch




Internal jumper enables Stop command response (DC 2).

**CONNECTOR** - Standard GPIB connector on rear panel.

**CONFORMITY** - Option 01 contains the following subset of capabilities (for explanation see IEEE Standard document) SH1, AH1, T1, TE0, L0, LF0, SR1, RL2, PP0, DT0, C0, DC0-DC2 selectable.

**GENERAL DESCRIPTION OF GPIB**

The General Purpose Interface Bus is a link or network by which system components communicate with each other. Each system participant performs at least one of these roles: Controller, Talker, or Listener.

A Controller manages bus communications primarily by directing or commanding which devices are to send data to other devices (Talker), or receives data from other devices (Listener) during an operational sequence. A controller may also be interrupted or it may command specific action between devices.

The GPIB consists of 16 lines which are grouped into three sets according to function; there are 8 data lines, 3 control lines, and 5 general management lines. The 8 data lines carry ASCII character (bit parallel) asynchronously; the control lines provide a data transfer handshake compatible with both slow and fast devices; the bus management lines allow initialization, interrupts, and special controls.

**CABLE** - One Canberra Model C1505-2 GPIB Data/Control cable 0.6m (2 feet) long is supplied for connection to the GPIB bus.

## OPTION 2072-02
## CANBERRA NIM DAISY CHAIN INTERFACE

### FEATURES

- Synchronous BCD data transmission, bit parallel, character serial.
- Readout sequence determined by interconnect order.
- Field installable.
- System control via individual Start, Stop, and Reset signals.
- Compatibility with existing Canberra counters and scanners.

### DESCRIPTION

The Canberra NIM Daisy Chain Interface Option provides the basic 2072 module with a readout/control capability compatible with previous Canberra data-acquisition series modules.

The problem of data transfer of the eight-digit 2072 to the standard six-digit system is handled by a toggle switch on the interface board. It selects either the six most significant digits or the six least-significant digits. Two digits are lost in either case.

Control signals, Start, Stop, and Reset are received only if the unit is to be a system slave. A master unit will generate Start, Stop, and Reset. This logic is under internal jumper control.

### SIGNALS

CONTROL IN - accepts Start, Stop, Reset, and Print pulses (5 volt negative going from +5 volt level, rise time 500 nanoseconds maximum, width 1.0 microseconds minimum. Also HOLD command (dc level change from +5 volt to +0.5 volts maximum during printout) is accepted. Rear panel 15-pin "D" connector (Amphenol 17-10150).

CONTROL OUT - provides Start, Stop, and Reset commands (5 volt negative going pulses from +5 volt level, rise time 500 nanoseconds maximum, width 1.9 microseconds minimum). Data output information is presented in the form of Serial BCD. (logic 1 = +4 to +5 volts dc, logic 0 = 0 to +0.5 volts dc). This connector also provides the "next unit" Print command: Eighth and successive Print command pulses are routed out via a logic gate. All control lines except Print command are wired directly between Control In and Control Out connectors. Rear panel 15-pin "D" connector (Amphenol 17-20150)

### CONTROLS

SIGNIFICANT DIGIT SWITCH ($10^7$-$10^2$/$10^5$-$10^0$) — $10^7$ - $10^2$ position selects readout of the six most-significant digits of the eight digit word. $10^5$ - $10^0$ position selects readout of the six least-significant digits of the eight digit word. Jumpers allow the Model 2072 to act as a system master or as a slave.

### CABLES

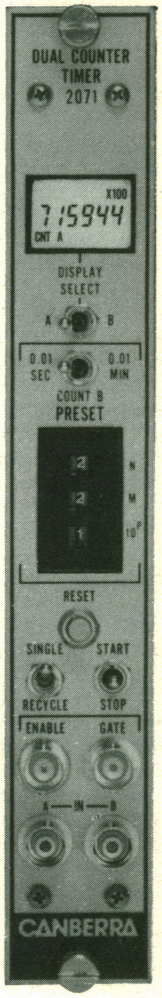
One Canberra Model C1404-2 Data/Control cable 0.6m (2 feet) long is supplied for connection to other Canberra data acquisition series modules.

CANBERRA

# Model 2071 Dual Counter Timer

## Features

- IEEE - 488 (GPIB) Bus
- 100 MHZ count capability for positive and negative inputs
- 8 decade count capacity, both channels
- Dual counter and timer
- 3 digit preset on time or counts
- Liquid crystal display with annunciators
- Crystal time base
- Single width NIM




## Description

The Canberra Model 2071 Dual Counter/Timer provides, in a single-width NIM module, two eight-decade counters, a crystal time base, and presetting logic. Normal operation is as a preset timer and event counter, or as a preset event counter and timer. However, the Model 2071 may also operate as a dual counter with preset timer without display of the preset data.

Both count inputs accept positive TTL voltages or negative NIM-current logic inputs at rates to 100 MHz without polarity switching or jumper changes.

The internal crystal time-base provides increments of 0.01 seconds or 0.01 minutes, front panel selectable, and live time gating at one microsecond resolution.

Display of either counter's contents is accomplished with a six-digit Liquid Crystal Display. The LCD includes eight annunciators which describe the display and dynamic state of the unit. Automatic x100 range shift provides an indication of the six most, or six least significant digits.

Preset control is accomplished with a three-digit thumbwheel switch providing a preset range from one to $99 \times 10^6$ increments. The preset setting takes the form of $NM \times 10^P$.

The SINGLE/RECYCLE mode switch provides a means of automatically placing the unit or system back into the counting mode ten seconds after preset or termination of the count mode is reached.

Master-Slave system operation can be accomplished via the front panel interconnection of the ENABLE signal, or by either of the two optional I/O Interfaces.

The Canberra NIM Daisy Chain option provides interfacing to all existing Canberra printing counters, timers, and readout scanners.

The alternate Canberra GPIB (IEEE-488) option provides interfacing to a GPIB bus, and allows a GPIB Controller to start, stop, and readout counting systems.

A convenient ENABLE output will allow the Model 2071 to start, stop, and reset single or multiple combinations of other Canberra Series 2000 counting modules.

Internal Jumpers can change the impedance of the count inputs for positive voltage pulses from 1k ohm to 50 ohms. This permits termination of cables from equipment that do not source match the coax, and prevents reflections from causing multiple counting.

Other jumpers prevent the resetting of channel A when the module starts counting. This allows accumulation of data in channel A. Gating may also be selected by jumpers, to gate both channel A and B, just channel A, or just channel B.

External connection to the GATE input will permit gating of incoming pulses when in the preset count mode, and gating of the time base when in the preset time mode. In this mode the gate provides one microsecond resolution. Thus when a system busy signal is connected to this input, the Model 2071 will provide extremely accurate dead time corrections.

## Specifications

**INPUTS**

A and B IN - Positive NIM logic (> +2.0 volts and < +6 volts peak, width > 5 nsec), or negative NIM logic (> -0.6 volts and < 1.6 volts peak, width > 4 nsec); input rise and fall time 1 nsec to 300 nsec; $Z_{in}$ = 1k ohm dc for positive signals (selectable by internal jumper to 50 ohms); $Z_{in}$ = 50 ohms dc for negative signals.

GATE - Counting control for channel A, channel B, or both (selectable by internal jumpers); +4 to +5 volts or open circuit allows counting; zero to +0.8 volts inhibits counting; $Z_{in}$ = 100k ohm to +5 V bus. When gating time in channel B, resolution is 1 μsec. this permits a system busy signal to be connected to the gate for accurate dead-time correction.

ENABLE - (Bidirectional) as input; zero to +0.8 volt level enables counting mode; +4 to +5 volts or open circuit disables counting mode; $Z_{in}$, 4.7k ohm to +5 volt bus.

# Specifications(continued)

**OUTPUTS**

ENABLE - (Bidirectional) as output; zero to +0.8 volt level indicates counting mode enabled and provides control of count mode to other modules; +4 to +5 volt level indicates counting mode disabled; sinks 20 mA, sources from 4.7k ohm to +5 volt bus.

OVERFLOW - + 5 volt pulse at reset of eighth decade; rise time or fall time less than 200 nanoseconds, width 0.3 microseconds; dc coupled; sinks 5 mA, sources 2.5 mA at 2.5 V; rear panel BNC connector; jumper determines source, A or B.

**FRONT PANEL CONTROLS**

START/STOP - two-position momentary toggle switch initiates or terminates a counting sequence.

RESET - manual push-button resets both conters to zero.

SINGLE/RECYCLE - two-position toggle switch selects single or recycle mode of operation upon reaching a preset condition.

0.01 SEC/COUNT B/0.01 MIN - Channel B time base or count selector; three-position toggle switch to select 0.01 seconds, 0.01 minutes, or the external IN B as the B counter and preset function. When time is selected Channel A counts external events through IN A. When Count B is selected Channel A counts time in seconds. An additional capability selected by internal jumpers provides a time preset, and event counting in channel A and B. In this case time is not available for display or readout.

A/B DISPLAY SELECT - two-position toggle switch selects which counter's contents are displayed on the LCD.

PRESET NM x $10^P$ - three-digit thumbwheel switch for channel B preset. M is units, N is tens, P is the power of 10. N and M range from 0 to 9; P has a range of 0 through 6; N=M=0 disables the Preset function.

**PERFORMANCE**

CAPACITY - eight decades per channel, allowing $10^8$-1 counts in each

COUNT RATE - 100 MHz max., positive or negative

PULSE PAIR RESOLUTION - 10 nanoseconds

CRYSTAL TIME BASE ACCURACY - ±0.0025% over operating temperature range.

TEMPERATURE OPERATING RANGE - 0 to 50°C.

PRESET COUNT CHANNEL - Limited to 1 MHz count rate; pulse width minimum 300 nsec.

**INDICATORS** - Six digit Liquid Crystal Display with auto (x100) shift for displaying six most-significant digits. Eight annunciators on LCD describe the display. These are: OF (overflow), x100, CNT, MIN, SEC, A, B, decimal point. Active counting is indicated by CNT, MIN, or SEC blinking. Leading zeroes are suppressed.

**INTERNAL CONTROLS**

STANDARD JUMPERS

- Clamp input A and B to +5 volts.
- Change input impedance of A and B to 50 ohms for positive inputs.
- Provide for gating channel A, channel B, or both.
- Inhibit reset of channel A when starting. In this mode channel A accumulates counts and is reset only by the manual push-button.
- Select overflow output from channel B. This is normally from channel A.
- Permit counting in both channels. In this mode the module may still be preset on time, however the time cannot be read out.
- Allow a pulse on $\overline{\text{ENABLE}}$ INPUT to start the module.

**POWER**

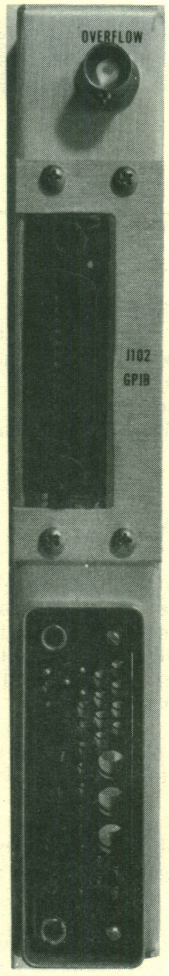
| | |
|---|---|
| + 12 | 85 mA |
| - 12 | 90 mA |
| + 24 | 35 mA |
| - 24 | 0 |

**PHYSICAL**

SIZE - standard single width NIM module; 3.43 x 22.13 cm (1.35 x 8.71 inches) per TID-20893 (rev. A)

NET WEIGHT - 0.94 kgs (2.05 lb.)

SHIPPING WEIGHT - 3.2 kgs (7.06 lb.)




## OPTION 2071-01
## GPIB [IEEE 488] INTERFACE

**FEATURES**

- Anynchronous ASCII data transmission bit parallel, character serial
- Uniquely addressable, switch controlled
- Talk/Listen mode
- Talk Only mode
- Auto recycle minimizes readout dead time
- Field installable
- Form feed or carriage return at end of word

**DESCRIPTION**

The General Purpose Interface Bus links a Canberra NIM counting module into the IEEE 488 standard communications network. As a Listener this interface receives Start, Stop, and Readout commands from a controller. As a Talker it supplies its accumulated data to a peripheral device. A Talk Only mode provides a controllerless means for a single module to read out to a peripheral Listener. The Auto Recycle mode allows the selected module to place itself (and the rest of the Canberra counting system) back into the count mode at the conclusion of its readout, thus minimizing system dead time. A side panel cutout provides access to Set/Verify a Talk/Listen Address, select Talk Only mode, enable Auto Recycle, or select Form Feed/Carriage Return at the end of a word. This interface is a single PC board with a connector that allows convenient field installation.

## SPECIFICATIONS

**SIGNALS** - The input/output signals on the GPIB connector are TTL compatible. True equals 0 to +0.4 volts, False equals +2.5 to +5 volts.

**CONTROLS** – Side-panel cutout provides access to:

Address select switches (5)
Talk-Listen/Talk Only switch
Auto Recycle switch
FF/CR switch

Internal jumper enables Stop command response (DC 2).

**CONNECTOR** - Standard GPIB connector on rear panel.

**CONFORMITY** - Option 01 contains the following subset of capabilities (for explanation see IEEE Standard document) SH1, AH1, T1, TE0, L0, FL0, SR1, RL2, PP0, DT0, C0, DC0/DC2 selectable.

## GENERAL DESCRIPTION OF GPIB

The General Purpose Interface Bus is a link or network by which system components communicate with each other. Each system participant performs at least one of three roles: Controller, Talker, or Listener.

A Controller manages bus communications primarily by directing or commanding which devices are to send data to other devices (Talker), or receives data from other devices (Listener) during an operational sequence. A controller may also be interrupted or it may command specific action between devices.

The GPIB consists of 16 lines which are grouped into three sets according to function; there are 8 data lines, 3 control lines, and 5 general management lines. The 8 data lines carry ASCII characters (bit parallel) asynchronously; the control lines provide a data transfer handshake compatible with both slow and fast devices; the bus management lines allow initialization, interrupts, and special controls.

**CABLE** - One Canberra Model C1505-2 GPIB Data/Control cable 0.6m (2 feet) long is supplied for connection to the GPIB bus.

# OPTION 2071-02
# CANBERRA NIM DAISY CHAIN INTERFACE

## FEATURES

- Synchronous BCD data transmission, bit parallel, character serial
- Readout sequence determined by interconnect order
- Field installable
- System control via individual Start, Stop, and Reset signals.
- Compatibility with existing Canberra counters and scanners.

## DESCRIPTION

The Canberra NIM Daisy Chain Interface Option provides the basic 2071 module with a readout/control capability compatible with previous Canberra data-acquisition series modules.

The problem of data transfer of the eight digit 2071 to the standard six-digit system is handled by a toggle switch on the interface board. It selects either the six most-significant digits or the six least-significant digits. Two digits are lost in either case.

Control signals, Start, Stop, and Reset are received only if the unit is to be a system slave. A master unit will generate Start, Stop, and Reset. This logic is under internal jumper control.

## SIGNALS

CONTROL IN - accepts Start, Stop, Reset, and Print pulses (5 volt negative going from +5 volt level, rise time 500 nanoseconds maximum, width 1.0 microseconds minimum. Also HOLD command (dc level change from +5 volt to +0.5 volts maximum during printout) is accepted. Rear panel 15-pin "D" connector (Amphenol 17-10150).

CONTROL OUT - provides Start, Stop, and Reset commands (5 volt negative going pulses from +5 volt level, rise time 500 nanoseconds maximum, width 1.9 microseconds minimum). Data output information is presented in the form of Serial BCD. (logic 1 = +4 to +5 volts dc, logic 0 = 0 to +0.5 volts dc). This connector also provides the "next unit" Print command: Eighth and successive Print command pulses are routed out via a logic gate. All control lines except Print command are wired directly between Control In and Control Out connectors. Rear panel 15-pin "D" connector (Amphenol 17-20150)

## CONTROLS

SIGNIFICANT DIGIT SWITCH ($10^7$-$10^2$/$10^5$-$10^0$) — $10^7$-$10^2$ position selects readout of the six most significant digits of the eight-digit word. $10^5$-$10^0$ position selects readout of the six least significant digits of the eight-digit word. Jumpers allow the Model 2071 to act as a system master or as a slave.

**CABLES** - One Canberra Model C1404-2 Data/Control cable 0.6m (2 feet) long is supplied for connection to other Canberra data acquisition series modules.